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6 November 1984

USSR Report

CHEMISTRY

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6 November 1984

USSR REPORT
CHEMISTRY

CONTENTS

ADSORPTION

- Adsorptive and Electrocatalytic Properties of Platinized
Platinum, Modified by Silver Adatoms
(M. M. D. Khimenes, et al.; ELEKTROKHIMIYA,
No 6, Jun 84)..... 1

ANALYTICAL CHEMISTRY

- Determination of Arsenic (III) in Acetonitrile by Method
of Inversion Voltamperometry on Platinum Electrode
(A. A. Ramadan, et al.; ZHURNAL ANALYTICHESKOY
KHIMII, No 7, Jul 84)..... 2

- Mutual Effect of As(III)-Hg(II) System Components and
Analytical Signals in Inversion Voltamperometry Method
(A. I. Kamenev, et al.; ZHURNAL ANALITICHESKOY
KHIMII, No 7, Jul 84)..... 2

- Gas Chromatographic Determination of Volatile Sulfur
Fluorides in Air
(V. G. Berezkin, Yu. S. Drugov; ZHURNAL
ANALITICHESKOY KHIMII, No 7, Jul 84)..... 3

BIOCHEMISTRY

- Determination Method of Mass Exchange Coefficients for
Oxygen Absorption in Biological Reactors
(G. P. Piteriskikh; TEORETICHESKIYE OSNOVY
KHIMICHESKOY TEKHNologii, No 4, Jul-Aug 84)..... 4

CATALYSIS

- Oxidation of Ascorbic Acid With Molecular Oxygen Catalyzed
With Tetrabenzo-Tetraazamacrocyclic Copper Complex
(K. B. Yatsimirskiy, Ya. Labuda; DOKLADY AKADEMII
NAUK SSSR, No 4, Jun 84)..... 5

Formation of Organic Products During Reduction of Carbon Dioxide in Aqueous Solutions in Presence of Luminophores (Ye. A. Shishkina, et al.; DOKLADY AKADEMII NAUK SSSR, No 4, Jun 84).....	6
Study of Alumina-Platina Catalysts, Calcined in Chlorine-Containing Gas (B. B. Zharkov, et al.; ZHURNAL PRIKLADNOY KHIMII, No 3, Mar 84).....	6
Recrystallization of Highly Dispersed Platinum Catalysts Under Effect of Reaction Medium (T. V. Kuzora, A. B. Fasman; ZHURNAL PRIKLADNOY KHIMII, No 3, Mar 84).....	7
New Highly Active Supported Palladium-Containing Catalysts for Selective Hydrogenation of Conjugated Dienes Into Olefins (A. V. Novikova, et al.; KINETIKA I KATALIZ, No 3, May-Jun 84).....	7
Oxidation of Olefins Under Nonstationary Conditions Over Molybdenum-Containing Catalysts (M. Yu. Kuttyrev, et al.; KINETIKA I KATALIZ, No 3, May-Jun 84).....	8
Hydrocarbon Synthesis From CO and H ₂ Over Catalysts Obtained by Thermal Decomposition of Carbonyl Clusters of Iron (A. L. Lapidus, et al.; KINETIKA I KATALIZ, No 3, May-Jun 84).....	8
Synthesis and Properties of Catalysts Obtained From Silicon-Molybdenum-vanadium Heteropoly Acids, Part 2: Properties of Catalysts in Oxidation Reactions of Acrolein to Acrylic Acid (N. N. Chumachenko, et al.; KINETIKA I KATALIZ, No 3, May-Jun 84).....	9
Iron Sulfate - Selective Catalyst for Dealkylation of 2,6-Di-Tert-Butyl-4-Methyl Phenol (Ye. T. Gorodetskiy, P. M. Gorbvoy; KINETIKA I KATALIZ, No 3, May-Jun 84).....	9
Possibility of Detection of Ionic Platinum Form in Aluminum-Platinum Catalysts (O. A. Kryukova, et al.; ZHURNAL FIZICHESKOY KHIMII, No 7, Jul 84).....	10

Chemisorption and Thermodesorption of Hydrogen on Supported Rhenium Catalysts (Kh. M. Minachev, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 7, Jul 84).....	10
Conversions of 1,1-Diacetylcyclopropane on Palladium Catalyst (R. A. Karakhanov, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 7, Jul 84).....	11
Distribution of Gas Velocity Fields in Fixed Granular Catalyst Bed During Lateral Injection Into Catalyst Apparatus (Ye. V. Badatov, et al.; TEORETICHESKIYE OSNOVY KHIMICHESKOY TEKHNOLOGII, No 4, Jul-Aug 84).....	11
Aromatization of Ethylene on High-Silicon Zeolites (O. V. Bragin, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	12
Behavior of Copper-Ruthenium Catalysts in Enantioselective Hydrogenation (T. I. Kuznetsova, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	12
Effect of gamma-Radiation on Catalytic Activity of Oxides of Titanium and Zirconium in Carbon Dioxide Reduction Processes (Ye. A. Shishkina, et al.; ZHURNAL NEORGANICHESKOY KHIMII, No 8, Aug 84).....	13
Prediction and Calculation of Catalyst Activity in Metal-Electrolyte Systems (G. S. Nikolayev; ELEKTROKHIMIYA, No 8, Aug 84).....	13
Behavior of Sulfur-Poisoned Palladium Electrodes During Cyclic Anode-Cathode Polarization (A. A. Sutyagina, V. A. Perepelitsa; ELEKTROKHIMIYA, No 8, Aug 84).....	14
CHEMICAL INDUSTRY	
Laggers are Cited (SOTSIALISTICHESKAYA INDUSTRIYA, 17 Aug 84).....	15
Study of Separating Capacity of Cyclonic Foam Quencher (S. V. Shorin, et al.; ZHURNAL PRIKLADNOY KHIMII, No 3, Mar 84).....	17

COAL GASIFICATION

- Study of Process of Filtration of Synthetic Fuel
(V. F. Khromykh; ZHURNAL PRIKLADNOY KHIMII, No 3,
Mar 84)..... 18

COMBUSTION

- Pyrolysis of Silane and Silane-Ammonia Mixtures by
Laser IR-Heating
(V. V. Nosov, et al.; KINETIKA I KATALIZ,
No 3, May-Jun 84)..... 19
- Study of Electrophysical Processes During Spontaneous
Combustion of Gases and Vapors of Organic Substances
(B. S. Fialkov, et al.; KINETIKA I KATALIZ,
No 3, May-Jun 84)..... 19

ELECTROCHEMISTRY

- Mixtures of Diglyme With Water and Ethyl Alcohol as
Media for Electrochemical Reduction of Difficult-to-Reduce
Organic Compounds
(G. P. Girina, et al.; ELEKTROKHIMIYA, No 6,
Jun 84)..... 21
- Adsorption and Electrochemical Behavior of Benzene and
its Chlorine Derivatives on Smooth Platinum Electrode
(V. Ye. Kazarinov, et al.; ELEKTROKHIMIYA, No 6,
Jun 84)..... 21
- Effect of Migratory Current on Alkali Diffusion Through
Chlorine Electrolyser Diaphragm
(G. I. Volkov, et al.; ELEKTROKHIMIYA, No 6, Jun 84)..... 22
- Structuring Bacteriorhodopsin in Bilaminar Lipid
Membrane by Single Layer Method
(V. M. Mirskiy, et al.; ELEKTROKHIMIYA, No 6,
Jun 84)..... 23
- Enthalpies of Lithium Tetrafluoroborate Solution in
Water, γ -Butyrolactone and in Their Mixtures
(T. F. Vasekina, et al.; ZHURNAL FIZICHESKOY KHIMII,
No 7, Jul 84)..... 23
- Relationship Between Diffusional and Migrational Mobility
of Sodium Ions in Perfluorinated Sulfocation Exchange
Membranes
(M. A. Spitsyn, et al.; ELEKTROKHIMIYA, No 8,
Aug 84)..... 24

Electron Photoemission Into Nonaqueous Media: Delocalized Electron Energy of Interaction With Solvent (R. G. Kokilashvili, et al.; ELEKTROKHIMIYA, No 8, Aug 84).....	24
Study of Au and Ag Coadsorption on Germanium Electrode (O. V. Romanov, A. M. Yafyasov; ELEKTROKHIMIYA, No 8, Aug 84).....	25
Electrochemical Oxidation of Glycylglycine on Silver (Ye. M. Tarasevich, et al.; ELEKTROKHIMIYA, No 8, Aug 84).....	25
Reactions of Hydrogen and Oxygen Liberation on Carbon Samples Treated at Different Temperatures (Ye. D. Serezhenko, et al.; ELEKTROKHIMIYA, No 8, Aug 84).....	26
Electrochemical Standard for Ellipsometry (N. Yu. Lyzlov, V. I. Pshenitsyn; ELEKTROKHIMIYA, No 8, Aug 84).....	26
Electroconductivity of Sodium Selective Membranes Based on Neutral Complexons (G. I. Shumilova, et al.; ELEKTROKHIMIYA, No 8, Aug 84).....	27

FREE RADICALS

Kinetic and Spectral Characteristics of Normal and Cyclic Hydrocarbon Radicals (B. Ya. Ladygin, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	28
---	----

INORGANIC COMPOUNDS

Reaction of Zinc Oxide With Chlorine (L. Ye. Derlyukova, et al.; ZHURNAL NEORGANICHESKOY KHIMII, No 8).....	29
Kinetics of Thermal Decomposition of Nitrozonium Trinitratouranylate and Anhydrous Uranyl Nitrate (G. N. Klavsut'; ZHURNAL NEORGANICHESKOY KHIMII, No 8, Aug 84).....	29
Interaction and Glassification Region in System As_2S_3 - Yb_2S_3 (T. M. Il'yasov, et al.; ZHURNAL NEORGANICHESKOY KHIMII, No 8, Aug 84).....	30
Mechanism of Structure Formation of Products in Processes c ^f Selfpropagating High-Temperature Synthesis (Yu. M. Maksimov, et al.; DOKLADY AKADEMII NAUK SSSR, No 4, Jun 84).....	30

Enthalpy and Heat Capacity of SrO in 1180-2650 K Range (Kh. Irgashov, et al.; ZHURNAL FIZICHESKOY KHIMII, No 7, Jul 84).....	31
Thermochemical Study of Trioxazaboratricycloalkanes (V. P. Vorob'yeva, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 7, Jul 84).....	31
ORGANOMETALLIC COMPOUNDS	
Contribution of Intermolecular Associates and Configurational Inversion of Antimony Bonds to Conformational Exchange of Certain 1,3,2-Dioxastibinanes and 1,3,2-Dioxastibepines (B. A. Arbuzov, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 7, Jul 84).....	32
ORGANOPHOSPHORUS COMPOUNDS	
Influence of N-Alkyl Substituent and Counterion on Kinetics of Radical Polymerization of Monomer Quaternary Diallyl Salts (G. T. Nazhmetdinova, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	33
Molecular and Crystalline Structure of Phenyl- α - Oxycyclohexylphosphinic Acid Chloride $C_6H_5(CYCLO-C_5H_{10}OH)$ P(O)Cl (N. A. Kardanov, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	34
Molecular and Crystalline Structure of rel-(rR,6R)-5- Thio-5-Phenyl-2,4,6-Triisopropyl-1,3,5-Dioxaphosphorinane (B. A. Arbuzov, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	34
Attachment of Nucleophilic Agents to Vinylidine Diphosphonic Acid, Part 2: Reaction of Vinylidine Diphosphonic Acid With Primary Amine, Ammonia and Hydrazine (I. S. Alfer'yev, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	35
Derivatives of 3-Chloro-4,5-Benzo-1,2,-Oxaphospholane (B. A. Arbuzov, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	35
Reactions of Diazaphosphols With Isocyanates (B. A. Arbuzov, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 5, May 84).....	36
PESTICIDES	
Chemistry and Food (Eduard Grigor'yevich Rozantsev; NOVOYE V ZHIZNI, NAUKE, TEKNIKE, SERIYA: KHIMIYA, No 5, May 84).....	37

PETROLEUM PROCESSING TECHNOLOGY

Drills Advancing on Steppe (G. Sazonov; PRAVDA, 17 Jul 84).....	46
Millions Without Profit (V. Kuz'mishchev, M. Odinetz; PRAVDA, 17 Jul 84).....	48
Armor for Pipelines (V. Lagovskiy; SOTSIALISTICHESKAYA INDUSTRIYA, 19 Aug 84).....	52
Catalytic Conversion of Cumene Under Hydrogen Pressure (N. G. Krupenya, et al.; ZHURNAL PRIKLADNOY KHIMII, No 3, Mar 84).....	54

PHARMACOLOGY AND TOXICOLOGY

Gas Chromatographic Determination of Content of Harmful Substances in Air of Industrial Locations (V. M. Pantayeva, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 83).....	55
--	----

POLYMERS AND POLYMERIZATION

Properties of Polycaproamide Fibers Modified by Grafted Polyacrylonitrile (S. E. Shalabi, et al.; KHIMICHESKIYE VOLOKNA, No 3, May-Jun 84).....	56
Low Temperature Synthesis of Polycaproamide Copolymers Grafted With Polydimethyl-Aminoethylmethacrylate (A. P. Khardin (deceased), et al.; KHIMICHESKIYE VOLOKNA, No 3, May-Jun 84).....	56
Synthesis of Reinforced Composite Threads Based on Polymer Mixtures (M. V. Tsebrenko; KHIMICHESKIYE VOLOKNA, No 3, May-Jun 84).....	57
Fire Retardant Cellulosehydrate Fibers (A. Ya. Ivanova, et al.; KHIMICHESKIYE VOLOKNA, No 3, May-Jun 84).....	57
Improved Uniformity of Viscous Textile Fibers Obtained by Altering Drying Procedures (A. D. Kirillov, et al.; KHIMICHESKIYE VOLOKNA, No 3, May-Jun 84).....	58
Synthesis of Antimicrobial Chemical Fibers and Fibrous Materials Containing Quaternary Ammonium Compounds and Their Utilization (V. M. Vaynburg, et al.; KHIMICHESKIYE VOLOKNA, No 3, May-Jun 84).....	58

Forming Fluorine-Containing Threads From Vinylidene Fluoride-Tetrafluoroethylene Copolymer by Dry Method (B. S. Vesayte, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 83).....	59
Study of Effectiveness of Fire-Resistant Activity of Antipyrenes for Fibers of Aromatic Polyamides (A. Ya. Ivanova, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 83).....	59
Effect of Degree of Polymerization of Polycaproadmide on Industrial Grade Thread Strength (M. Ya. Gusakov, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 83).....	60
Polymer-Carbon Black Interaction in Electrically Conducting Fiber-Forming Composites (L. Ya. Konovalova, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 83).....	60
Effect of Polymer Matrix on Properties of Fibers Obtained by Caking Polymer Dispersions (A. L. Koldobskiy, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 83).....	61
Preparation of Fire-Resistant Infusible Polycaproamide Fiber (A. V. Efros, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 83).....	61
Flammability, Smoke Emission and Heat Resistance of Modified Oksalon Fibers (V. A. Tarasov, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 83).....	62
Polymerization of 4MPI in Presence of Modified Ziegler-Natt Type Catalysts (M. A. Budanova, et al.; PLASTICHESKIYE MASSY, No 7, Jul 84).....	62
Copolymerization of Oligocarbodimides With Terminal Isocyanate Groups With Epoxydiane Resin (G. I. Shukurov, et al.; PLASTICHESKIYE MASSY, No 7, Jul 84).....	63
Effect of Zinc Content on Electric Properties of Polyzincorganosiloxanes (I. M. Kostylev, et al.; PLASTICHESKIYE MASSY, No 7, Jul 84).....	63
Antifrictional Properties of PA-12 Reinforced With Fibrous Fillers (M. L. Kerber, et al.; PLASTICHESKIYE MASSY, No 7, Jul 84).....	63

Thermomechanical Properties of Radiationally Solidified Oligoesteracrylates (N. V. Lomonosova, Yu. A. Chikin; PLASTICHESKIYE MASSY, No 7, Jul 84).....	64
Adhesion of Reactoplastics to Steel (A. D. Sokolov, et al.; PLASTICHESKIYE MASSY, No 7, Jul 84).....	64
Effectiveness of Utilization of Polymer Materials in Agroindustrial Complexes (S. G. Grokhovskiy; PLASTICHESKIYE MASSY, No 7, Jul 84).....	65
Sensitization of Photostructuralization (Photocrosslinking) of Polymers With Selected Organic Azides and Triazenes (A. V. Pochinok, et al.; UKRAINSKIY KHIMICHESKIY ZHURNAL, No 7, Jul 84).....	65
Photosensibilized Crosslinking of High Pressure Polyethylene With 9,10-Phenanthrenquinone (O. V. Shapoval, et al.; UKRAINSKIY KHIMICHESKIY ZHURNAL, No 7, Jul 84).....	66
Effect of Peroxides and Aliphatic Mercaptans on Molecular Weight Distribution of Synthesized Polystyrene (V. I. Mel'nichenko, et al.; UKRAINSKIY KHIMICHESKIY ZHURNAL, No 7, Jul 84).....	66

RADIATION CHEMISTRY

Natural Radiation Dose Absorbed by Organic Materials From Sedimentary Rocks (I. Ya. Sklyarenko, et al.; DOKLADY AKADEMII NAUK SSSR, No 4, Jun 84).....	68
Thermochemical Characteristics of Uranium Fluoride UF_n Molecules (L. N. Gorokhov, et al.; ZHURNAL FIZICHESKOY KHIMII, No 7, Jul 84).....	68

WATER TREATMENT

Study of Structure of Precipitates, Forming During Electrocoagulation Purification of Waste Effluent (I. V. Savitskaya, et al.; ZHURNAL PRIKLADNOY KHIMII, No 3, Mar 84).....	70
Purification of Acidic Industrial Effluent With Calcium Carbonate Sludge (S. F. Koren'kova, et al.; VODOSNABZHENIYE I SANITARNAYA TEKHNIKA, No 7, Jul 84).....	70

Equipment for Damping Hydraulic Shock (E. P. Ashchiyants, R. M. Rafaelyan; VODOSNABZHENIYE I SANITARNAYA TEKHNIKA, No 7, Jul 84).....	71
Steel Pipes With Internal Cement-Polymer Lining (Z. E. Litinskiy, et al.; VODOSNABZHENIYE I SANITARNAYA TEKHNIKA, No 7, Jul 84).....	71
Electrochemical Oxidation of 'Roxaphenol H-6' Over Platinum Electrodes (Z. Gozhka, A. Sokha; ELEKTROKHIMIYA, No 8, Aug 84).....	72

ADSORPTION

UDC 541.135

ADSORPTIVE AND ELECTROCATALYTIC PROPERTIES OF PLATINIZED PLATINUM, MODIFIED BY SILVER ADATOMS

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 6, Jun 84 (manuscript received 4 Feb 83) pp 798-801

KHIMENES, M. M. D., GLADYSHEVA, T. D. and PODLOVCHENKO, B. I., Moscow State University imeni M. V. Lomonosov

[Abstract] A quantitative study was made of the adsorption of silver on Pt/Pt and the effect of silver adatoms on the adsorption properties of platinum and its electrocatalytic activity in the electrooxidation of methanol. The adsorption of silver was conducted on a pre-aged Pt/Pt electrode from a solution 1 N sulfuric acid and 0.001 N Ag_2SO_4 at 700 mv adsorption potential and 640 mv Nernst potential. The degree of coating with adatoms was controlled by varying the residence time of the electrode at a given potential and computed by three different methods. It was established that adsorption of silver atoms on Pt/Pt at 650 mv does not result in significant change in the limiting adsorption quantity. Figures 4; references 14: 9 Russian, 5 Western. [308-12765]

UDC 543:25:546:19

DETERMINATION OF ARSENIC (III) IN ACETONITRILE BY METHOD OF INVERSION VOLT-AMPEROMETRY ON PLATINUM ELECTRODE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 7, Jul 84
(manuscript received 1 Jul 83) pp 1234-1237

RAMADAN, A. A., MANDIL', Kh., AGASYAN, P. K., MUSTAFA, I. and KAMENEV, A. I.,
Haleb University, Syria; Moscow State University imeni M. V. Lomonosov

[Abstract] The goal of this study was to determine As(III) in acetonitrile using inversion voltamperometry with platinum electrode. It was shown that reduction of As(III) to the elemental level occurred at electrode potentials less than -1.0 V, the quantity of elemental As increasing at the electrode with drop of potential to -1.6 V. The method is sensitive and reproducible; at the 10^{-7} M level relative standard deviation was less than 0.023. An anode peak of arsenic was observed during the preelectrolysis of As(III) on the background of 0.1 M LiClO₄ solution in acetonitrile. The effect of the potential and duration of the preelectrolysis, as well as the effect of the linear potential sweep rate and of the concentration of As(III) on the anode signal of arsenic was investigated. Figures 3; references 10: 7 Russian, 3 Western (1 by Russian author).
[350-7813]

UDC 543.25

MUTUAL EFFECT OF As(III)-Hg(II) SYSTEM COMPONENTS AND ANALYTICAL SIGNALS IN INVERSION VOLTAMPEROMETRY METHOD

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 7, Jul 84
(manuscript received 29 Jul 83) pp 1242-1248

KAMENEV, A. I., MUSTAFA, I. and AGASYAN, P. K., Moscow State University imeni M. V. Lomonosov

[Abstract] The system As(III)-Hg(II) was investigated in an attempt to determine conditions for analysis of arsenic with glass-carbon electrode. The data accumulated from a number of runs along with analysis of literature citations

led to the following conclusion: the effect of mutual influence between As(III) and Hg(II) is observed in the potential range where arsine is liberated and the precipitate corresponding to the peak II represents a product of chemical interaction between arsenic and mercury formed during the preelectrolysis stage. For analytical purposes this arsenic-mercury reaction product should be dissolved. Figures 6; references 19: 13 Russian, 6 Western.
[350-7813]

UDC 543.27:543.544

GAS CHROMATOGRAPHIC DETERMINATION OF VOLATILE SULFUR FLUORIDES IN AIR

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 7, Jul 84
(manuscript received 31 Aug 83) pp 1249-1254

BEREZKIN, V. G. and DRUGOV, Yu. S., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences; Scientific Research Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] An analytical method was developed for the determination of toxic products from thermooxidative destruction of sulfur hexafluoride (650-850°C) found in the surrounding air of the work zone in production of high quality magnesium alloys. Sulfur hexafluoride (0.6-1.2%) and carbon dioxide (3-6%) are used as the protective atmosphere. The method involved preliminary concentration of lower sulfur fluorides in a cold trap filled with "porapak Q" followed with thermodesorption of concentrated impurities and their determination using a flame-photometric detector. The sensitivity of this method was 0.01 mg/m³ and relative standard deviation 0.22-0.26. It was shown that when the temperature of the alloy increased from 720 to 800°C, the content of HF over it increased from 6.7 to 15.5 mg/m³. When zirconium alloy was introduced into this product, the concentration of HF above it reached the level of 52 mg/m³, showing that it catalyzed the CF₆ thermodestruction process. Figures 2; references 15: 8 Russian (1 by Western author), 7 Western.
[350-7813]

DETERMINATION METHOD OF MASS EXCHANGE COEFFICIENTS FOR OXYGEN ABSORPTION IN BIOLOGICAL REACTORS

Moscow TEORETICHESKIYE OSNOVY KHIMICHESKOY TEKHNologii in Russian Vol 18, No 4, Jul-Aug 84 (manuscript received 3 Apr 82) pp 449-456

PITERSKIKH, G. P.

[Abstract] Mass exchange between gas and liquid occurs in many chemical and biological processes. The available data on mass exchange during aeration are inadequate for calculations involving industrial equipment. A new method was developed for determining the volume coefficient of mass exchange ($k_L a$) based on radioactive indicator krypton-85 which is an excellent model for the absorption rate determination of oxygen and other gases under aseptic industrial conditions. The changes in the concentration of the indicator are measured with serial radiometers with practically no inertia. The coefficients of distribution between gas phase and water is about of the same order of magnitude for krypton as it is for oxygen. Other measurements also showed that krypton is a good model for oxygen. The method is based on determination of the desorption rate of dissolved krypton-85 during air bubbling through water. Theoretical calculations were carried out for the determination of $k_L a$ on laboratory level and extrapolating it to industrial volume. Figures 4; references 13: 7 Russian (4 by Western authors), 6 Western.
[352-7813]

CATALYSIS

UDC 541.49:546.561:546.562

OXIDATION OF ASCORBIC ACID WITH MOLECULAR OXYGEN CATALYZED WITH TETRABENZO-TETRAAZAMACROCYCLIC COPPER COMPLEX

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 4, Jun 84
(manuscript received 25 Oct 83) pp 880-883

YATSIMIRSKIY, K. B., academician, UkSSR Academy of Sciences and LABUDA, Ya.,
Institute of Physical Chemistry imeni Ya. V. Pisarzhevskiy, UkSSR Academy of
Sciences, Kiev

[Abstract] The kinetics and mechanism of oxidation of ascorbic acid with molecular oxygen in presence of a copper complex with tetrabenzo[b,f,j,n]x[1,5,9,13]-tetraazacyclohexadecine (TAAV) has been studied previously. An induction period had been noted when oxygen was present in the aqueous solution during which the ascorbic acid was oxidized with molecular oxygen. This time, a polarographic method was used to study the reactions as well as the oxidation of ascorbic acid with macrocyclic copper complex Cu(TAAV)^{2+} under anaerobic conditions using a spectrophotometric method. It was shown that without $[\text{Cu(TAAV)}^{2+}]$, molecular oxygen did not oxidize ascorbic acid; the reaction rate has a semi-first order of magnitude in respect to the dissolved oxygen. There exists almost a complete analogy between kinetic equations of the catalytic and non-catalytic oxidation of ascorbic acid with different oxidizers $[\text{O}_2 \text{ and } \text{Cu(TAAV)}^{2+}]$. Comparison of the mechanism of action of the catalytic activity of Cu(TAAV)^{2+} with other copper-containing catalysts showed that it had some specific properties but in general it resembled synthetic metal complexes of porphyrin. References 8: 4 Russian, 4 Western.
[310-7813]

FORMATION OF ORGANIC PRODUCTS DURING REDUCTION OF CARBON DIOXIDE IN AQUEOUS SOLUTIONS IN PRESENCE OF LUMINOPHORES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 4, Jun 84
(manuscript received 15 Sep 83) pp 913-915

SHISHKINA, Ye. A., KOLOMNIKOV, I. S., LYSYAK, T. V., RUDNEV, A. V., KALYAZIN, Ye. P. and KHARITONOV, Yu. Ya., Moscow Chemical-Technological Institute imeni D. I. Mendeleyev; Moscow State University imeni M. V. Lomonosov

[Abstract] In an attempt to increase the yield of organic products in a photolysis of $\text{CO}_2\text{-H}_2\text{O}$ system, the following luminophores were used as catalysts: K-14 (zinc sulfide activated with silver) and K-35 (zinc-silicate activated with manganese). Both luminophores increased the yield of formaldehyde and oxalic acid. Maximum yield of formaldehyde was obtained after 45 min from the beginning of illumination, maximum yield of oxalic acid--after 90 minutes.

References 3 (Western).

[310-7813]

UDC 542.973

STUDY OF ALUMINA-PLATINA CATALYSTS, CALCINED IN CHLORINE-CONTAINING GAS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 3, Mar 84
(manuscript received 4 Jun 82) pp 514-518

ZHARKOV, B. B., YEVRASHIN, V. M., KLIMENKO, T. M., DOBROTVORSKIY, A. M. and RUBINOV, A. Z.

[Abstract] Chlorine, a basic component of gasoline reforming catalysts, acts as a promotor and also has other functions as well. It has been proposed that an aluminum-chlorine-platinum complex forms on the reforming catalyst surface. This is confirmed by the increase in thermal stability of alumina-platina catalysts following calcination in a chlorine-containing gas at 500-600°. In the present work the interaction of chlorine with this catalyst was studied in greater detail. After treating aluminum oxide and alumina-platina catalyst made from it with a mixture of steam, chlorine and air, the latter was found to contain 1 : 2 atomic ratio of Cl : Pt. This quantitatively confirms the formation of strong bonds between platinum and chlorine in the catalyst. Magnetic measurement also showed that this treatment increases the dispersion of small platinum crystallites, thereby converting the platinum into an atomically divided state and thus strengthening the metal-carrier bond.

Figure 1; references 12: 9 Russian, 3 Western.

[314-12765]

RECRYSTALLIZATION OF HIGHLY DISPERSED PLATINUM CATALYSTS UNDER EFFECT OF REACTION MEDIUM

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 3, Mar 84
(manuscript received 16 Jun 82) pp 522-525

KUZORA, T. V. and FASMAN, A. B., Institute of Organic Catalysis and Electrochemistry, KaSSR Academy of Sciences

[Abstract] A study was made of the stability of Raney-Pt catalysts prepared from Pt-Cu alloys in low temperature (20°) liquid phase hydrogenation reactions of hexene-1 and benzaldehyde. Catalysts having the highest stability were prepared from Pt-Cu alloys containing 1-5 atomic % Pt and significant quantities of copper oxides and hydroxides. The latter inhibit the growth finely divided platinum particles and crystals. References 13: 8 Russian, 5 Western.
[314-12765]

UDC 547.313+542.941.7+547.315.2

NEW HIGHLY ACTIVE SUPPORTED PALLADIUM-CONTAINING CATALYSTS FOR SELECTIVE HYDROGENATION OF CONJUGATED DIENES INTO OLEFINS

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 3, May-Jun 84
(manuscript received 21 Sep 83) pp 583-587

NOVIKOVA, A. V., KOVALEVA, L. S., PARENAGO, O. P. and FROLOV, V. M., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences, Moscow

[Abstract] Heterogeneous palladium-containing catalysts were prepared and studied as catalysts for selective hydrogenation of dienes into olefins. The catalysts were prepared by reaction of palladium chloride with tertiary aliphatic amines and impregnating various mineral carriers with the reaction products. Conditions were found at which catalytic activity is maximum and the promoting action of molecular oxygen was established. Kinetic studies of the diene hydrogenation reaction in the presence of palladium catalysts showed it to be zero order in respect to the substrate. Figures 4; references 7: 5 Russian, 2 Western.
[322-12765]

OXIDATION OF OLEFINS UNDER NONSTATIONARY CONDITIONS OVER MOLYBDENUM-CONTAINING CATALYSTS

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 3, May-Jun 84
(manuscript received 1 Feb 83) pp 625-629

KUTYREV, M. Yu., KIRSOVA, A. A., ZURMUKHTASHVILI, M. Sh. and MARGOLIS, L. Ya.,
Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] While propylene and isobutylene are oxidized under stationary conditions over a number of molybdate catalysts into unsaturated aldehydes and acids at 300-400°C, at lower temperatures the olefins have been observed to convert into acetone, acetaldehyde, acetic acid and aromatic hydrocarbons. This reaction was therefore studied in the present work under nonstationary conditions in an impulse microreactor to clarify the mechanisms of the underlying processes. At 50-150°C, the chief products of propylene oxidation are acetone and benzene. Programmed thermodesorption with mass spectrometry of the reaction products showed that unsaturated aldehydes do not form from propylene and isobutylene molecules adsorbed on Co- and Mg-Mo or bismuth molybdate catalysts. A significant drop in the selectivity of propylene to acrolein oxidation was observed as the concentration of propylene in the reaction mixture was reduced. Figures 4; references 11: 6 Russian, 5 Western. [322-12765]

HYDROCARBON SYNTHESIS FROM CO and H₂ OVER CATALYSTS OBTAINED BY THERMAL DECOMPOSITION OF CARBONYL CLUSTERS OF IRON

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 3, May-Jun 84
(manuscript received 4 Feb 83) pp 636-640

LAPIDUS, A. L., SAVEL'YEV, M. M., SOMINSKIY, S. D. and TSAPKINA, M. V.,
Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Hydrocarbon synthesis, especially olefines, from carbon monoxide and hydrogen has great practical significance. A mixture of C₁-C₆ hydrocarbons containing up to 60% olefines can be obtained from CO and H₂ in the presence of K₂[Fe(CO)₄] and K₂[Fe(CO)₂(C₂H₅)] complexes on alumina or silica as catalysts. A study was therefore made of the catalytic properties of polynuclear carbonylferrate anion on alumina. IR-spectroscopy showed that the mononuclear anion [Fe(CO)₄]⁻² is formed during thermal treatment of clustered carbonylferrate anion base catalysts. Such catalysts manifest activity in hydrocarbon synthesis from CO and H₂ at 350-450° and atmospheric pressure. Total ethylene and propylene content comprised 3-48% by volume. Figures 2; references 5: 3 Russian, 2 Western. [322-12765]

SYNTHESIS AND PROPERTIES OF CATALYSTS OBTAINED FROM SILICON-MOLYBDENUM-VANADIUM HETEROPOLY ACIDS, PART 2: PROPERTIES OF CATALYSTS IN OXIDATION REACTIONS OF ACROLEIN TO ACRYLIC ACID

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 3, May-Jun 84
(manuscript received 4 Mar 83) pp 659-661

CHUMACHENKO, N. N., TARASOVA, D. V., NIKORO, T. A. and YAROSLAVTSEVA, I. V.,
Institute of Catalysis, Siberian Department, USSR Academy of Sciences,
Novosibirsk

[Abstract] A study was made of the catalytic properties of catalysts, prepared from silicon-molybdenum-vanadium heteropoly acids, in the oxidation of acrolein to acrylic acid. The catalyst is shown to have relatively low activity when used in bulk. An active and selective catalyst may be prepared by impregnation of a coarse silica gel with the heteropoly acid solution. However, impregnation of finely-dispersed silica gel results in a catalyst of low activity. This is apparently due to the formation and stabilization of various forms of vanadium molybdenum compounds on the carrier surface. References 5: 3 Russian, 2 Western.
[322-12765]

UDC 547.562.563.07(088.8)

IRON SULFATE - SELECTIVE CATALYST FOR DEALKYLATION OF 2,6-Di-Tert-BUTYL-4-METHYL PHENOL

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 3, May-Jun 84
(manuscript received 15 Jun 83) p 764

GORODETSKIY, Ye. T. and GORBOVOY, P. M., Ternopol State Medical Institute

[Abstract] A study shows that iron sulfate on "ASKG"-grade silical gel is a highly active catalyst for the dealkylation of 2,6-tert-butyl-4-methyl phenol to 2-tert-butyl-4-methyl phenol, the yield being 91-4%, selectively 92.4-100% and degree of conversion 98.9%. This is apparently due to the presence of Bronsted and Lewis acids. References 3 (Russian).
[322-12765]

POSSIBILITY OF DETECTION OF IONIC PLATINUM FORM IN ALUMINUM-PLATINUM CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 7, Jul 84
(manuscript received 6 Jan 83) pp 1683-1686

KRYUKOVA, O. A., DOROFYEVA, T. V., ZAKHAROVA, M. N., LUNINA, Ye. V. and STRAKHOV, B. V., Moscow State University imeni M. V. Lomonosov

[Abstract] It was discovered that during catalytic breakdown of 2-methyl-2-nitrosopropane over aluminum-platinum catalysts, along with the formation of nitroxyl radicals, new paramagnetic centers were formed--platinum ions in an intermediate oxidation state. The conditions of the formation of platinum ions were studied; the paramagnetic Pt ions were observed only in oxidized samples, suggesting that the most probable process of the formation of Pt ions was the result of the reduction of Pt^{4+} present on the surface of the catalyst after thermal treatment in air. The relative increase of Pt ions on the catalyst surface was related to relative decrease of total Pt concentration in the sample. Figures 3; references 9: 5 Russian, 4 Western.
[348-7813]

CHEMOSORPTION AND THERMODESORPTION OF HYDROGEN ON SUPPORTED RHENIUM CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 84 (manuscript received 10 Apr 83) pp 1456-1464

MINACHEV, Kh. M., AVAYEV, V. I., DMITRIYEV, R. V. and RYASHENTSEVA, M. A., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] High temperature reversible chemisorption of H_2 on supported Re-catalysts was investigated by the thermosorption method as a function of the nature of the carrier and concentration of metal and starting Re(VII) compounds used in preparation of catalysts. Re-catalysts reduced with H_2 at 500°C showed considerable chemisorption of H_2 at high temperatures. Two temperature ranges were identified for thermal desorption of H_2 : 1--70 to 400°C and 2--500 to 800°C. The magnitude of this process is related to the concentration of Re, the type of Re(VII) compounds used and the nature of the carrier. An increase in the concentration and a decrease in interaction of Re with the carrier facilitated its reduction leading to lower dispersion of the metal. Using hydrogenation of benzene as an example, it was shown that the activity of Re, under the experimental conditions studied, depended on the bond strength of absorbed H_2 and did not correlate with the specific surface of the metal. Figures 3; references 21: 12 Russian (1 by Western authors), 9 Western.
[355-7813]

CONVERSIONS OF 1,1-DIACETYLCYCLOPROPANE ON PALLADIUM CATALYST

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 84 (manuscript received 28 Sep 83) pp 1663-1664

KARAKHANOV, R. A., VARTANYAN, M. M., KARZHAVINA, N. P., ISAYEVA, L. V. and IGNATENKO, A. V., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Heating 1,1-diacetylcyclopropane (I) at 400°C yields 2-methyl-3-acetyl-4,5-dihydrofurane. Catalytic conversion of I at 350°C over 5% Pd/C yields 2-methyl-3-acetylfurane and 3-ethylpentanedione-2,4. The last reaction occurs only in presence of DMSO found as an impurity of I. When highly purified I, free of DMSO was used, its conversion over 5% Pd/C was nonselective.

References 5: 2 Russian, 3 Western.

[355-7813]

DISTRIBUTION OF GAS VELOCITY FIELDS IN FIXED GRANULAR CATALYST BED DURING LATERAL INJECTION INTO CATALYST APPARATUS

Moscow TEORETICHESKIYE OSNOVY KHIMICHESKOY TEKHNologii in Russian Vol 18, No 4, Jul-Aug 84 (manuscript received 8 Dec 81) pp 541-545

BADATOV, Ye. V., MATROS, Yu. Sh. and MARTYNOV, G. P., Catalysis Institute, Siberian Department, USSR Academy of Sciences

[Abstract] The occurrence of large heterogeneity in gas velocity fields in the immobile granular layer of the catalyst due to internal and external causes was investigated. The experiments were done in a vertical column filled with monodispersed spherical glass particles. The column was 100-800 mm high, 400 mm in diameter and the glass particles ranged from 2 to 20 mm in diameter. In general, when the rate of flow was uniform before entering the layer, the flow was reasonably uniform throughout the bed except that initially the rates along the walls were faster than in the central portion. A different situation was observed with an uneven flow before the column. The effects of initial heterogeneity as a function of the coefficient of hydraulic resistance of the granular bed was plotted. Only one of the examined laboratory setups required some procedure to correct the heterogeneity of flow prior to entering the column.

Figures 4; references 12: 11 Russian, 1 Western.

[352-7813]

AROMATIZATION OF ETHYLENE ON HIGH-SILICON ZEOLITES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 84 (manuscript received 15 Apr 83) pp 996-1001

BRAGIN, O. V., VASINA, T. V., PALISHKINA, N. V., ISAKOV, Ya. I., KHELKOVSKAYA-SERGEYEVA, Ye. G., NEFEDOV, B. K. and MINACHEV, Kh. M., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] A study is reported of the catalytic activity and selectivity of action in conversion of ethylene, n-hexane and 1-hexene by a series of pentasil-type zeolites. The zeolites were tested in H, HNa, and Na-forms. The hydroxyl coating of some of the zeolites was studied by IR spectroscopy in diffuse-scattered light. It was found that in the 300 to 500°C interval the H form of type TsVM zeolite with molar ratio $\text{SiO}_2/\text{Al}_2\text{O}_3=33$ is most active in aromatization of ethylene. Selectivity, formation of benzene and toluene increased in both H-TsVM and H-TsVK-k zeolites with increasing temperature. IR spectroscopy can be used to judge the catalytic activity of both sodium and hydrogen forms of the zeolites studied. Na-TsVM and Na-TsVK-l are practically inactive in oligomerization and aromatization of ethylene but highly active in isomerization and disproportionation of 1-hexene. Figures 4; references 11: 6 Russian, 5 Western.
[289-6508]

UDC 541.128:542.941

BEHAVIOR OF COPPER-RUTHENIUM CATALYSTS IN ENANTIOSELECTIVE HYDROGENATION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 84 (manuscript received 9 Jun 83) pp 1002-1005

KUZNETSOVA, T. I., VEDENYAPIN, A. A. and KLABUNOVSKIY, Ye. I., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] A study was made of CuRu catalysts applied on aerosil and modified by R, R-Aartaric acid in liquid phase hydrogenation of ethylacetoacetate. The catalysts were prepared by saturating aerosil type A-300 with an aqueous solution of Cu and Ru chlorides, subsequent drying and reduction for three hours in a current of H_2+He . Synergism was found in enantioselective hydrogenation of ethyl acetate on the catalysts. Catalysts with high activity generally yielded lower values of p or were not enantioselective at all. This is explained by competitive hydrogenation of ethylacetoacetate on dissymmetrical centers consisting primarily of copper atoms and nonselective centers consisting primarily of Ru atoms. For skeletal catalysts a two-layer model has been suggested, assuming that the copper phase is coated by the ruthenium phase. For the catalysts here studied another model is more appropriate, probably a cluster model. Figures 2; references 4: 3 Russian, 1 Western.
[289-6508]

EFFECT OF gamma-RADIATION ON CATALYTIC ACTIVITY OF OXIDES OF TITANIUM AND ZIRCONIUM IN CARBON DIOXIDE REDUCTION PROCESSES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 8, Aug 84
(manuscript received 18 May 83) pp 2143-2144

SHISHKINA, Ye. A., KOLOMNIKOV, I. S., LYSYAK, T. V., RUDNEV, A. V., KALYAZIN, Ye. P. and KHARITONOV, Yu. Ya., Moscow Chemical-Technologic Institute imeni D. I. Mendeleev; Moscow State University imeni M. V. Lomonosov

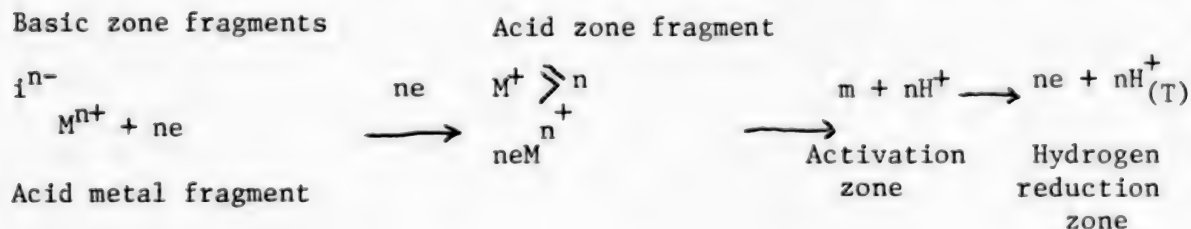
[Abstract] A study shows that the catalytic properties of titanium and zirconium oxides in carbon dioxide-water reactions are enhanced by preliminary treatment with gamma-radiation. The radiation dosage has an effect on the yields of hydroxy and carboxylic acids. Thus, at $0.65 \cdot 10^{21}$ to $4.61 \cdot 10^{21}$ ev/mil, the yields of formaldehyde, glycolic, oxalic and malonic acids changed markedly. Irradiation of the catalysts apparently alters the electron structure within the catalyst. References 2: 1 Russian, 1 Western.
[370-12765]

PREDICTION AND CALCULATION OF CATALYST ACTIVITY IN METAL-ELECTROLYTE SYSTEMS

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 6 Dec 82, after revision 10 Nov 83) pp 1022-1027

NIKOLAYEV, G. S., Tomsk Polytechnic Institute imeni S. M. Kirov

[Abstract] Electrolyte solutions are widely used to treat metal surfaces. The relationship between acid-base reactions among individual fragments of the associates in the system metal-electrolyte was analyzed. On the basis of the results obtained, a method was developed for prognostication of the activity of heterogeneous catalysts for such systems and for quantitative determination of this activity. Individual processes occurring between the acid fragment of the metal and the basic fragment of the medium, as well as between the basic metal fragment and acid medium fragment were discussed as they related to the totality of quantitative interactions of the system. The following diagram was used to illustrate the interactions between active centers and metal-electrolyte system:



The correlation equation and the calculated results discussed in this paper represented adequately the activity of the catalysts. They could be used in estimating the quantitative relationships in the metal-electrolyte systems. References 10 (Russian).

[364-7813]

UDC 541.13;542.973.6;546.98

BEHAVIOR OF SULFUR-POISONED PALLADIUM ELECTRODES DURING CYCLIC ANODE-CATHODE POLARIZATION

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 11 Jul 83) pp 1120-1123

SUTYAGINA, A. A. and PEREPELTSIA, V. A., Moscow State University imeni M. V. Lomonosov

[Abstract] Behavior of palladium electrodes poisoned with sulfur from thiourea of H_2S solutions was studied during cyclic anode-cathode polarization which was used to remove the poisons from the surface of electrodes. The cathode reduction curves of the poisoned palladium showed higher values in the potential range 1.1-1.3 V than those of pure palladium. In this potential range, PdO_2 is reduced directly to the metal, bypassing the formation stage of lower oxides. An assumption is expressed that on the palladium surface liberated of the chemoabsorbed sulfur during the electrode cycling up to $E_r > 1.0$ V, the formation of palladium (IV) oxides was facilitated along with $E_r >$ shift towards the anode side. Appearance of the peak at E_r 1.1 V was possibly due to their reduction. Figures 3; references 14: 8 Russian, 6 Western (1 by Russian authors).

[364-7813]

CHEMICAL INDUSTRY

LAGGERS ARE CITED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Aug 84 p 3

[Text] Solombalsk Cellulose-Paper Combine

According to goals of 7 months of this year, the All-Union Industrial Association "Soyuztsellyuloza", to which 15 enterprises belong, did not complete the plan for realizing finished products for 22 million rubles. Almost 1/3 of all debts to the government--6,924,000 rubles--is owed to the share of the Solombalsk Cellulose-Paper Combine, which is in the Arkhangelsk Oblast.

However, today this enterprise is dragging behind in other basic ways. The commodity production plan from the beginning of the year has not been completed here by 11 million rubles and they have produced 19,839 tons below the planned amount of cellulose.

How do combine managers explain such a situation?

"In the first half year, we had a steady supply from oil-refining enterprises," complains V. Popov, head engineer of the combine. "They gave altogether 4.5 thousand tons less mazut. The second reason is the repair of the core regeneration boiler. Because of this, we were forced to completely shut down one of our technical flows for 3 months."

Can these arguments be a justification?

While a reproach to the mazut suppliers can be understood (without fuel, you really will not produce much cellulose), the repair of the boiler is entirely on the conscience of the cellulose workers themselves. After all, this repair was planned. The "Soyuztsellyuloza" organization knew about it 2 years ago. That amount of time is entirely sufficient in order to foresee all necessary measures for completion of inevitable losses.

Gorlovsk Plant of Industrial Rubber Products

The uneven, unstable operations of this young enterprise were already established from the project's infringements. During construction of the plant, the USSR Ministry of the Oil Refining and Petrochemical Industry and the UkSSR Main Petroleum Refining and Petroleum Industry did not allot the necessary capital investments and left the enterprise without preparatory production, hoping that the allied plants of Lisichansk and Stakhanov would supply the raw material.

But they work with technical rubber, and they need a special kind here--footwear rubber. While they attracted scientists and reconstructed the raw material base, the plant suffered. As a result, from the beginning of the year, it has owed consumers more than 400,000 pairs of rubber shoes. A shortage of equipment and prepared personnel adversely affected the work lag. Now, it is true, Gorlovsk citizens are receiving the necessary quality of rubber, but their indicators are still far from the plan and they have hardly managed to remove the assumed debt.

Now it is already time to think about the future of the enterprise, about its development. After all, the time is not far off when local finished production will begin to guarantee the allied plant in Zaporozh'e with rubber, when it will be necessary to complete large volumes of work for repairing tires and conveyer belts. But the tempo is clearly inconvenient for Gorlovsk citizens: appropriation of capital investments is on a level of 28-30 percent. Although equipment has been delivered to the site long ago, organizations of the republic Ministry of Construction of Heavy Industry Enterprises and the Ministry of Installation and Special Construction are in no hurry and allot few people and equipment for the construction job.

Nevinnomysk "Azot" (Nitrogen) Association

This year our nation's farmers have not received 36,000 tons of concentrated nitrogen fertilizer and a lot of other valuable production from Nevinnomysk chemists. And this debt has not yet been reduced. The enterprise's worker collective (director V. Prokhorov) who recently were among the winners of a socialist competition and who have taken various initiatives, turned out to be among those falling behind.

A high accident rate, little work and technical discipline, weak control over fulfillment of resolutions and insufficient exactions on the part of management toward subordinates has led to many standstills, losses and reduction of production quality. As a result of shutdowns in the water-reverse cycle here, there is no way they can checkout the technical process. With the introduction of new production, the old shops have gone out of control. Technical management by the enterprise has been weakened: for example, in recent years, 4 head engineers have been replaced. There are not enough qualified workers here. During repairs (and their quality has also gone down) of a large-tonnage ammonia machine, insufficient preparation and oversight of the attendants led to one of the auxiliary boilers going out of order. It could not be reduced and, as a result, almost a month was lost. And all of this time, ammonium production of carbamide and nitrate was halted due to the absence of commodity ammonia.

There are not enough large-capacity pumps or spare parts for various equipment. All of this leads to daily losses of 200-300 tons of fertilizer.

12473

CSO: 1840/354

STUDY OF SEPARATING CAPACITY OF CYCLONIC FOAM QUENCHER

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 3, Mar 84
(manuscript received 29 Nov 82) pp 568-572

SHORIN, S. V., VETOSHKIN, A. G. and KUTEPOV, A. M., Moscow Institute of Chemical Machine Building

[Abstract] Foam may be effectively broken by forcing it through a constriction so that the flow rate increases markedly while the static pressure drops causing the gas phase to expand and foam bubbles to become dynamically unstable and break. When operating at high pressure gradients, large bubbles break up and generate small stable bubbles, resulting in a two-phase system of fine bubbles suspended in liquid which is normally diverted to a centrifugal separator. An experimental study of the effects of the design parameters of a cyclonic foam quencher on its separating capacity shows that the electrical conductivity of a secondary foam, after passing through the cyclone, changes exponentially and forms a family of S-shaped curves at various through-put rates. Functional relationships, including cyclone geometry, may be determined from the relationship of unbroken foam to liquid in the separator. The column height of residual foam in the separator is directly proportional to the gas feed rate in the cyclone constriction and to the diameter of the overflow outlet. Figures 7; references 4 (Russian).
[314-12765]

STUDY OF PROCESS OF FILTRATION OF SYNTHETIC FUEL

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 3, Mar 84
(manuscript received 8 Feb 83) pp 648-655

KHROMYKH, V. F.

[Abstract] One of the most complex problems in coal liquifaction is separation, from the fuel, of solid impurities ranging in size from 10 to less than 1 micron. A study was made of the filtration of heavy synthetic fuels (boiling points in excess of 325°) containing particles of ash, residual coal, catalyst, as well as asphalts and tar. Fuel samples, provided by the Institute of Mined Fuels were obtained by continuous hydrogenation of Irsha-Borodinsk coal at 425° and 10 MPa in the presence of a past former and catalyst and distilled below 325°. Filtration was studied on experimental units at the USSR Academy of Sciences Institute of Physical Chemistry with sludge filters of 1 and 150 cm² surface area at constant pressure (0.5-0.8 MPa) and 20-180° using perlite and diatomite filtration powders. Mathematical equations are presented which describe the separation of suspended matter. Figures 5; references 13: 6 Russian, 7 Western.
[314-12765]

UDC 541.128

PYROLYSIS OF SILANE AND SILANE-AMMONIA MIXTURES BY LASER IR-HEATING

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 3, May-Jun 84
(manuscript received 31 Jan 83) pp 530-534

NOSOV, V. V., REPINSKIY, S. M. and DUL'TSEV, F. N., Institute of Semiconductor Physics, Siberian Department, USSR Academy of Sciences, Novosibirsk

[Abstract] Dielectric layers are currently synthesized in the gas phase directly onto silicon bases employing reactions of silane or chlorosilane with ammonia, oxygen or nitrous oxide. Research shows that these reactions are multi-routed and take place in many stages, and that the characteristics of the individual stages, particularly those taking place in the gaseous phase, must be known in order to optimize the preparation of layers having pre-assigned chemical properties. In the present work gas phase pyrolysis of silane and silane-ammonia mixtures was studied employing a CO₂ laser. Effective activation energies and pre-exponential factors were determined. Silane pyrolysis is shown to take place via molecular and radical-chain mechanisms. No stable products having an Si-N bond are formed during gas phase pyrolysis of silane-ammonia mixtures, although an intermediate product is possible. Figures 3; references 18: 12 Russian, 6 Western.
[322-12765]

UDC 536.468-662.61

STUDY OF ELECTROPHYSICAL PROCESSES DURING SPONTANEOUS COMBUSTION OF GASES AND VAPORS OF ORGANIC SUBSTANCES

Moscow KINETIKA I KATALIZ in Russian Vol 25, No 3, May-Jun 84
(manuscript received 22 Feb 83) pp 535-539

FIALKOV, B. S., SHEBEKO, Yu. N., MURAVLEV, V. K. and IL'IN, A. B., Chemical-Metallurgical Institute, KaSSR Academy of Sciences, Karaganda

[Abstract] Combustion of organic substances is accompanied by non-equilibrium ionization, the greatest degree of ionization being in the high temperature zone of the flame, although notable concentrations of ions have been observed in the earlier, low temperature stages of combustion. Since this phenomenon

has been studied for only a small number of compounds, a study was undertaken of the electrophysical phenomena taking place during spontaneous combustion of a large variety of compounds, viz., ethanol, acetone, benzene, diethylamine, pentane, diethyl ether, A-72 gasoline, dibromotetrafluoroethane, dichloromethane, and three mixtures of ethanol with 1,2-dibromotetrafluoroethane. Relationships of temperature to passive sonde potential and conductivity current during the induction period were determined. The effective activation energy for the conductivity current-temperature relationship was found to be 230 kilojoules per mole, which agrees with that determined for the induction period in the spontaneous combustion of acetylene-air mixtures in shock waves. Figures 3; references 14: 11 Russian, 3 Western.

[322-12765]

ELECTROCHEMISTRY

UDC 541.138.3:547

MIXTURES OF DIGLYME WITH WATER AND ETHYL ALCOHOL AS MEDIA FOR ELECTROCHEMICAL REDUCTION OF DIFFICULT-TO-REDUCE ORGANIC COMPOUNDS

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 6, Jun 84 (manuscript received 10 Oct 82) pp 778-781

GIRINA, G. P., KOKOREKINA, V. A., FEOKTISTOV, L. G., ALPATOVA, N. M., OVSYANNIKOVA, Ye. V. and D'YACHENKO, A. I. [deceased], Institute of Electrochemistry, USSR Academy of Sciences, Moscow; Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] It was shown previously that certain organic compounds that are difficult to reduce produce sharp waves in diglyme. However, as a solvent, diglyme has many drawbacks. It has a dielectric constant of 7 and a viscosity of 2 cp, so that solutions of salts in diglyme have poor electroconductivity. In the present work it was found that mixtures of diglyme with water and ethanol may be used to conduct electroreduction processes at very high cathode potentials. Satisfactory results were achieved with 3:1:1 mixtures of diglyme, water and ethanol in the presence of tetrabutyl ammonia as background on mercury at high cathode potentials. Figures 2; references 6: 3 Russian, 3 Western.
[308-12765]

UDC 541.138:54-183

ADSORPTION AND ELECTROCHEMICAL BEHAVIOR OF BENZENE AND ITS CHLORINE DERIVATIVES ON SMOOTH PLATINUM ELECTRODE

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 6, Jun 84 (manuscript received 26 Nov 82) pp 782-789

KAZARINOV, V. Ye., MAKSIMOV, Kh. A., GOROKHOVA, L. T. and VASIL'YEV, Yu. B., Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] Hydrochloric acid off-gas, a multi-ton by-product of chloro-organic production, may be used for direct electrochemical synthesis of other chloro-organic compounds. However, surface adsorption of both initial material and end product on the electrodes has a significant effect on the process. In the

present work a complex potentiodynamic impulse method was used to study adsorption and electrochemical behavior of benzene, chlorobenzene and dichlorobenzene on a smooth platinum electrode. It is shown that at moderate degrees of filling, adsorption of the above substances is described by a logarithmic isotherm. Introduction of a substituent to the nucleus decreases the degree of filling of the surface with chemisorbed particles. Chemosorbed particles of benzene, chlorobenzene and dichlorobenzene are reduced at potentials below 5 millivolts and are oxidized at 1.2 volts or above. Figures 7; references 14: 11 Russian, 3 Western.
[308-12765]

UDC 621.357.1

EFFECT OF MIGRATORY CURRENT ON ALKALI DIFFUSION THROUGH CHLORINE ELECTROLYSER DIAPHRAGM

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 6, Jun 84 (manuscript received 26 Apr 79, after revision 14 Sep 81) pp 805-807

VOLKOV, G. I., KUR'YANOVA, T. P., MAZANKO, A. F. and MEL'NIKOVA, S. A.,
Moscow

[Abstract] Alkali losses in chlorine diaphragm electrolyzers are compiled by equations that are based on a comparison of the transfer of chlorine to the anode compartment through the diaphragm by diffusion and the migration of hydroxyl ions along with the anolyte stream from the anode compartment to the cathode. These equations are normally treated as a total, although the fact that the sum of the migration stream and the diffusion countercurrent are equal suggests that in the absence of electrolyte countercurrent, the current yield will be equal to zero. This has not been verified experimentally. In the present work experiments were conducted in a model electrolyser having an oxide-ruthenium cross-cut anode on a titanium base and a steel screen cathode. The diaphragm was compressed between the anode and cathode which were 3 mm apart. Tests with asbestos and fluorocarbon diaphragms show that the migratory stream suppresses the diffusion stream by eliminating the alkali concentration gradient in the diaphragm or some part of it. Current density and temperature have no effect on the current yield. This also confirms the fact that alkali losses at the cathode after having reached a certain current density are solely the result of ion migrations. References 5: 4 Russian, 1 Western.
[308-12765]

STRUCTURING BACTERIORHODOPSIN IN BILAMINAR LIPID MEMBRANE BY SINGLE LAYER METHOD

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 6, Jun 84 (manuscript received 28 Mar 83) p 861

MIRSKIY, V. M., SOKOLOV, V. S. and MARKIN, V. S., Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] Development of a dependable method for transmembranal structuring of bacteriorhodopsin (BR) into a bilaminar lipid membrane (BLM) is a key problem in the study of the electrical properties of BR, a biological photo-electrochemical converter. It was previously shown that this may be achieved with a liposome method although quantitative study of the electrical parameters is encumbered by the presence of adsorbed proteoliposomes. A method for structuring BR in BLM from single layers was proposed but the work lacked data on the effects of proteophores on the photocurrent. In the present work, transmembranal structurization of BR in BLM was confirmed by studying the effects of protonophore tetrachlorotrifluoro-methylbenzimidazole (TTFB) on the photocurrent of membranes formed from single layers. The volt-ampere characteristics of these membranes were also studied. The BLM was formed on a 5 mcm-thick teflon film with a 0.3 mm dia orifice. A photocurrent of 0.5-1.2 pA was observed in the presence of light which stabilized to 0.1-0.3 pA. Addition of TTFB did not increase the photocurrent but did increase the membrane's conductivity by one order of magnitude. This confirmed the absence of adsorbed fragments of bacteriorhodopsin plates, so that the above method can be said to provide transmembranal structuring of BR in BLM. References 3: 2 Russian, 1 Western. [308-12765]

ENTHALPIES OF LITHIUM TETRAFLUOROBORATE SOLUTION IN WATER, γ -BUTYROLACTONE AND IN THEIR MIXTURES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 7, Jul 84 (manuscript received 24 Jun 83) pp 1845-1847

VASEKINA, T. F., KUSHNIR, E. Yu. and SEREBRENNIKOVA, G. M. (deceased), All-Union Scientific Research Institute of Chemical Reagents and Ultrapure Chemical Compounds, Moscow

[Abstract] The goal of this work was to study lithium tetrafluoroborates in water, an aprotic solvent-- γ -butyrolactone--and in their mixtures. The theoretical interest was in obtaining data on the structure of electrolyte solutions in mixed solvents. Experimental results were reported on: heat of solutions of LiBF_4 in the above solvent system at 25°C, enthalpies of solution and heats of solvation of Li^+ and BF_4^- ions in γ -butyrolactone. Figures 4; references 7: 5 Russian, 2 Western. [348-7813]

RELATIONSHIP BETWEEN DIFFUSIONAL AND MIGRATIONAL MOBILITY OF SODIUM IONS IN PERFLUORINATED SULFOCATION EXCHANGE MEMBRANES

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 30 Dec 82) pp 1063-1068

SPITSYN, M. A., ANDREYEV, V. N., KAZARINOV, V. Ye., KOKOYLINA, D. V. and KRISHTALIK, L. I., Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] The effect of membrane microstructures on their transport properties and on the characteristics of diffusional and migrational mobility of ions was studied on perfluorinated sulfocation exchange membranes MF-4SK and Nafion. Transport of sodium ions through the membranes was investigated as a function of the base in contact with it; an assumption was made that a change in base concentration will lead to a change in swelling and in the content of moisture of the membranes resulting in changes of their microstructure. Analysis of experimental data showed that formation of ionic pairs is not the determining factor in the growth of the coefficient P during the decrease of the moisture content of the membranes studied; some contribution could be due to these ionic pairs. The principal reason for this phenomenon is due to the changes in the microstructure of membranes. Figures 2; references 16: 3 Russian, 13 Western.
[364-7813]

ELECTRON PHOTOEMISSION INTO NONAQUEOUS MEDIA: DELOCALIZED ELECTRON ENERGY OF INTERACTION WITH SOLVENT

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 25 Jan 83) pp 1075-1080

KOKILASHVILI, R. G., YELETSKIY, V. V. and PLESKOV, Yu. V., Institute of Electrochemistry imeni A. N. Frumkin, USSR Academy of Sciences, Moscow

[Abstract] Study of photoemission of electrons from metals into electrolyte solutions yields a unique possibility to determine energetic characteristics of "excess" (delocalized and solvated) electrons in polar media. In the present study, based on the measurements of photoemission currents, determination was made of the work of the discharge of an electron from mercury into different solvents. The calculated values of real and ideal energies of the interaction of solvents with delocalized electrons were tabulated. All solvents effectively "adsorbed" the delocalized electron. Although with the available data, definitive conclusions could not be reached regarding the interaction of delocalized electron with polar solvents, some correlation was observed between the energy of the electron and the structure of the solvent. Figures 3; references 26: 13 Russian (2 by Western authors) 13 Western (1 by Russian author).
[364-7813]

STUDY OF Au AND Ag COADSORPTION ON GERMANIUM ELECTRODE

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 21 Sep 82) pp 1081-1085

ROMANOV, O. V. and YAFYASOV, A. M., Leningrad State University imeni A. A. Zhdanov

[Abstract] Coadsorption of Au and Ag microimpurities on the surface of germanium electrodes was studied. Gradual addition of microimpurities to the solution led to a two-stage adsorption process: during the first stage adsorption of Ag and Au lead to increased capture on rapid surface states, increased rate of surface recombinations and a decreased potential of germanium electrode; during the second stage, a decreased surface activity is observed for Au and Ag microimpurities in respect to the parameters of the interphase border. The limiting stage for the adsorption of these microimpurities includes the diffusion processes towards the electrode surface. During the first stage, microfoci of Au are formed on the surface of Ge; when Ag is introduced, the number of these foci decreases but they become larger in size. During the second stage a compact covering of the Ge surface with Ag and Au atoms take place. Figures 2; references 11: 9 Russian, 2 Western.
[364-7813]

UDC 541.138.2

ELECTROCHEMICAL OXIDATION OF GLYCLGLYCINE ON SILVER

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 11 Apr 83) pp 1093-1095

TARASEVICH, Ye. M., BOGDANOVSKAYA, V. A. and YARLYKOV, M. M., Moscow Chemical-Technologic Institute imeni D. I. Mendeleyev; Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] Electrochemical behavior of glycylglycine on a silver electrode was studied by the potentiodynamic method in the concentration range 10^{-3} to $5 \cdot 10^{-1}$ M and pH values from 3 to 12. It was shown that glycylglycine is irreversibly adsorbed on silver. The oxidation rate of glycylglycine did not depend on the pH value. Electrocatalytic effect of increased solution rate of silver in presence of glycylglycine in the solution was established. Figures 4; references 5 (Russian).
[364-7813]

REACTIONS OF HYDROGEN AND OXYGEN LIBERATION ON CARBON SAMPLES TREATED AT DIFFERENT TEMPERATURES

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 14 Apr 84) pp 1096-1099

SEREZHENKO, Ye. D., DRIBINSKIY, A. V., TARASEVICH, M. R. and SHULEPOV, S. V., Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] The relationship of the thermal treatment temperature (TTT) to the activity of carbon specimens in the reaction of hydrogen and oxygen liberation was investigated. Changes in TTT affected hydrogen liberation overvoltage, the rate of this reaction and the slopes of polarization curves. Three areas could be identified corresponding to various stages of structural-chemical interaction in the carbon material: 1300-1700°C corresponding to carbonization, 1700-2000°C--precrySTALLIZATION phase and above 2000°C--graphitization stage. It was established that the more perfect the structure of carbon sample, the lower the amount of bound oxygen on its surface and the oxygen liberation process predominated on its surface. Figures 4; references 14: 10 Russian, 4 Western. [364-7813]

ELECTROCHEMICAL STANDARD FOR ELLIPSOMETRY

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 30 Aug 83) pp 1139-1140

LYZLOV, N. Yu. and PSHENITSYN, V. I., All-Union Scientific Research Storage Battery Institute, Leningrad

[Abstract] Experiments carried out on various metals (Ni, Fe, Pb, Cu, Al), whose surfaces were prepared by different methods (polishing, spraying, compression between polished quartz mirrors), showed that the reproducibility of Δ_o and ψ_o for a given metal was in the range of only 10' to 30'. To be able to verify the accuracy of optical elements, a standard was developed based on liquid, ideally polarized electrode in contact with a solution of surface-inactive electrolyte (for example Hg in 1 M KF). Ellipsometric parameters (Φ , Δ_o , ψ_o) for such a standard were determined and tabulated. References 4 (Western). [364-7813]

ELECTROCONDUCTIVITY OF SODIUM SELECTIVE MEMBRANES BASED ON NEUTRAL COMPLEXONS

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 20 Jul 83) pp 1140-1143

SHUMILOVA, G. I., ALAGOVA, Z. S. and MATEROVA, Ye. A., Leningrad State University imeni A. A. Zhdanov

[Abstract] Electroconductivity of membranes depends on their internal state which is related to their structure and concentration as well as composition of the solution in contact with such a membrane. It was shown earlier that electroconductivity of membranes containing a neutral complexon nonactin decreases in time during contact with aqueous solutions of the electrolytes. In the present paper data are reported on the electroconductivity of membranes based on an acyclic complexon selective towards the Na^+ ions. Bringing the membrane containing such complexons, structuralizing component and plasticizer in contact with aqueous electrolyte leads to the following processes on the surface and in-depth: absorption of the electrolyte and water, and leaching of organic plasticizer and inorganic admixtures. These processes occur at different rates and the resulting electroconductivity is determined by their ability to compete with each other. Freshly prepared membranes were brought in contact with NaCl solution; during the first day their electroconductivity diminished markedly. Then a steady state was reached. After the steady state was achieved, the membranes were dried and retested, showing a similar behavior as before. Data obtained supported the assumption that hydrophilic ions are immobilized with the dispersive phase in the membrane based on neutral complexon A. Figure 1; references 5: 4 Russian, 1 Western.
[364-7813]

UDC 541.127+543.422:541.15:541.515

KINETIC AND SPECTRAL CHARACTERISTICS OF NORMAL AND CYCLIC HYDROCARBON RADICALS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 84 (manuscript received 16 Mar 83) pp 1018-1023

LADYGIN, B. Ya., ZIMINA, G. M. and VANNIKOV, A. V., Institute of Electrochemistry, USSR Academy of Sciences, Moscow; State Scientific Research and Planning Institute of Nitrogen Industry and Products of Organic Synthesis, Moscow

[Abstract] The spectral and kinetic characteristics of cyclododecyl radicals in liquid cyclododecane are studied by the method of pulsed radiolysis. The information produced is compared to the characteristics of normal hydrocarbon radicals with the same number of atoms in the chain, as well as data from the literature on pulsed radiolysis of liquid cyclohexane and n-hexane, in which cyclohexyl and hexyl radicals are obtained. The results confirm the production of hydrocarbon radicals by electron radiation with absorption spectra consisting of single bands with maxima at 235-240 nm. Increasing the chain length of normal hydrocarbon radicals from C_1 to C_6 is accompanied by an increase in the wavelength of the maximum. The results also indicate that this tendency is characteristic for cyclic radicals which typically have longer wavelength of the spectral maximum. The absolute values of rate constants of cyclododecyl and dodecyl radical death rates were calculated from the extension coefficients found earlier for isooctyl radicals. The variation in spectral and kinetic characteristics of hydrocarbon radicals with chain structure and number of C atoms is analyzed. Figures 3; references 17: 11 Russian, 6 Western. [289-6508]

UDC 546.131

REACTION OF ZINC OXIDE WITH CHLORINE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 8
(manuscript received 17 May 83) pp 1934-1937

DERLYUKOVA, L. Ye., VINOKUROV, A. A. and YEVDOKIMOV, V. I., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] The reaction of zinc oxide with gaseous chlorine may be used to prepare anhydrous zinc chloride. The chlorine is adsorbed on the zinc oxide surface where it reacts and the zinc chloride is then recovered by sublimation. In order to select optimum conditions, however, it is first necessary to know the kinetics of the process. A study was made of gas-phase chlorination of zinc oxide at 550-750°C with samples having 1.5, 3.4, and 45 m²/g specific surface. The specific surface was found to decrease for all samples. The rate of zinc chloride sublimation per unit of surface is shown to be independent of the preparation conditions and the initial specific surface of the zinc oxide. Activation energies for all three samples were the same. Figures 4; references 6: 3 Russian, 3 Western.
[370-12765]

UDC 546.791+546.174

KINETICS OF THERMAL DECOMPOSITION OF NITROZONIUM TRINITRATOURANYLATE AND ANHYDROUS URANYL NITRATE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 8, Aug 84
(manuscript received 27 Dec 82) pp 2051-2056

KLAVSUT', G. N., Scientific-Research Institute of Applied Physics Problems imeni A. N. Sevchenko, Minsk

[Abstract] The kinetics of nitrozonium trinitratouranylate (TNN) is important from the standpoint of knowing the precise conditions for the synthesis of anhydrous uranyl nitrate as well as the thermal properties of TNN itself, which is formed during reaction of uranium oxides with liquid nitrogen tetroxide and appears promising as a heat carrier in fast neutron nuclear power plants. In

the present work a study of the kinetics of decomposition TNN and uranyl nitrate at isothermal conditions under vacuum shows that TNN is converted to anhydrous uranyl nitrate at 130-180°C. The process takes place in one stage and has an apparent activation energy of 26.1 ± 2.4 kcal/mole. Anhydrous uranyl nitrate decomposes to amorphous uranium trioxide without intermediate compound formation. The calculated activation energy for the process of 32.1 ± 1.3 kcal/mole correlates well with that calculated from derivatographic data. Figures 4; references 15: 11 Russian, 4 Western.
[370-12765]

UDC 546.49'22+546.668'22

INTERACTION AND GLASSIFICATION REGION IN SYSTEM As_2S_3 - Yb_2S_3

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 8, Aug 84
(manuscript received 22 Jul 83) pp 2094-2095

IL'YASOV, T. M., MAMEDOV, A. I. and RUSTAMOV, P. G.

[Abstract] The results of a phase diagram study of the system As_2S_3 - Yb_2S_3 are presented. A compound having the composition YbAsS_3 was detected and the glassification boundary based on As_2S_3 was determined. Figures 2; references 6: 4 Russian, 2 Western.
[370-12765]

UDC 546

MECHANISM OF STRUCTURE FORMATION OF PRODUCTS IN PROCESSES OF SELFPROPAGATING HIGH-TEMPERATURE SYNTHESIS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 4, Jun 84
(manuscript received 4 May 83) pp 891-894

MAKSIMOV, Yu. M., MERZHANOV, A. G., PAK, A. T., RASKOLENKO, L. G. and BRAVERMAN, B. Sh., Scientific Research Institute of Applied Mathematics and Mechanics, Tomsk State University imeni V. V. Kuybyshev

[Abstract] The mechanism of the formation of structure during selfpropagating high-temperature (SHS) synthesis was investigated in the system Ti-B-Fe. Reaction conditions were selected to obtain maximum yield of high melting TiB_2 particles whose crystallization and cooling led to formation of material with different structures. The starting materials consisted of titanium powder, amorphous boron and carbonyl iron. It was shown that the maximum temperature of the process was between the lines of liquidus and solidus for all compositions studied. X-ray phase analysis identified formation of phases TiB_2 and Fe; occasionally traces of FeB, TiB and Fe_2B were found. Between the crystals, particles with eutectic TiB_2 -Fe were noted. The temperature profile of this process could be divided into 4 zones: 1--heating zone of the starting

material; at this stage principal heat evolution occurred determining the spread of the combustion wave where complex processes occur forming eutectic mixtures and TiB_2 ; zone 2--precipitation of TiB_2 granules; zone 3--crystallization of eutectic TiB_2 -Fe and zone 4--cooling of the solid product. The composition of starting materials resulted in different combustion temperatures and that in turn led to different structures of the final product. Porosity of the product rises sharply above $1900^\circ C$. Most uniform products formed at lower temperatures. Figures 4; references 6 (Russian).
[310-7813]

UDC 536.63

ENTHALPY AND HEAT CAPACITY OF SrO IN 1180-2650 K RANGE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 7, Jul 84
(manuscript received 24 May 83) pp 1839-1840

IRGASHOV, Kh., TARASOV, V. D. and CHEKHOVSKOY, V. Ya., Institute of High Temperatures, USSR Academy of Sciences, Moscow

[Abstract] The enthalpy and heat capacity of SrO was studied for the first time in the temperature range 1180-2650 K. SrO samples were obtained by thermal decomposition of $Sr(NO_3)_2$ at 1200 K in graphite crucibles. The data obtained were tabulated. Empirical equations were used to approximate values applicable to the range of from 298 to 2650 K. Total measurement error in determining the enthalpy of SrO did not exceed 1%. References 6: 4 Russian, 2 Western.
[348-7813]

UDC 541.11:547.1'127

THERMOCHEMICAL STUDY OF TRIOXAAZABORATRICYCLOALKANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 84 (manuscript received 12 May 83) pp 1493-1496

VOROB'YEVA, V. P., MIROSHNICHENKO, Ye. A., SOLOMENNKOVA, I. I., ZELCHAN, G. I., LUKEVITS, E. and LEBEDEV, Yu. I., Institute of Chemical Physics, USSR Academy of Sciences, Moscow; Institute of Organic Synthesis, Latvian Academy of Sciences, Riga

[Abstract] Thermochemical investigation of trioxaazaboratricycloalkanes: 2,8,9-trioxa-5-aza-1-boratricyclo[3.3.3.0^{1,5}]undecane; 2,9,10-trioxa-6-aza-1-boratricyclo[4.3.3.0^{1,6}]dodecane; 2,10,11-trioxa-6-aza-1-boratricyclo[4.4.3.0^{1,6}]tridecane and 2,10,11-trioxa-6-aza-1-boratricyclo[4.4.4.0^{1,6}]tetradecane was carried out using the method of calorimetry of combustion and vapor formation reactions. Thermochemical characteristics and enthalpies of the hydrolysis and sublimation of these atranses were reported. The boron-nitrogen bonds strength was calculated to be about 57 kJ/mole, assuming a 25.1 kJ/mole stress energy for a five member ring and 0 kJ/mole--for a six member ring. References 10: 8 Russian (2 by Western authors), 2 Western.
[355-7813]

UDC 541.63:543.422.25:547.243.2

CONTRIBUTION OF INTERMOLECULAR ASSOCIATES AND CONFIGURATIONAL INVERSION OF
ANTIMONY BONDS TO CONFORMATIONAL EXCHANGE OF CERTAIN 1,3,2-DIOXASTIBINANES AND
1,3,2-DIOXASTIBEPINES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7,
Jul 84 (manuscript received 31 May 83) pp 1501-1510

ARBUZOV, B. A., AGANOV, A. V., KLOCHKOV, V. V., SAMITOV, Yu. Yu., MAREYEV, Yu. M.
and VINOGRADOVA, V. S., Kazan State University imeni V. I. Ul'yanov-Lenin;
Chemical Institute imeni A. M. Butlerov, Kazan State University imeni V. I.
Ul'yanov-Lenin

[Abstract] Stereochemistry of heterocyclic compounds containing antimony have been inadequately studied. On the basis of prior studies, it could be expected that conformational properties of the compounds with trivalent antimony from could be "hidden" as a result of the formation of various associated compounds with participation of Sb(III) atom. In the present study it was shown that dimeric structures of trivalent antimony compounds are formed with involvement of endo- and exo-cyclic oxygen atoms. Molecular dynamics was determined by conformational conversion and by the process of the formation and breakdown of the dimer bridge bonds Sb...O. The last step appeared to be the rate determining step. The mechanism of this reaction and the energy of the process were determined. The NMR ^1H and ^{13}C spectra of these compounds were reported and the dominant conformations of these monomers were established. The IR data will be reported in a future paper. Figures 4; references 18: 9 Russian, 9 Western.
[355-7813]

UDC 541.127:541.64:547.315.3

INFLUENCE OF N-ALKYL SUBSTITUENT AND COUNTERION ON KINETICS OF RADICAL
POLYMERIZATION OF MONOMER QUATERNARY DIALLYL SALTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5,
May 84 (manuscript received 23 Mar 83) pp 1024-1025

NAZHMETDINOVA, G. T., SHREYDER, V. A., TOPCHIEV, D. A. and KABANOV, V. A.,
Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of
Sciences, Moscow

[Abstract] A study was made of the influence of the nature of N,N-diallyl-
N,N-dialkylammonium halides on initial polymerization rate in aqueous solutions.
Polymerization of monomers by a cyclic-linear chain growth mechanism was per-
formed under identical conditions for all halides. The results indicate that
the nature of the monomer salt influences the kinetics of polymerization.
Substitution of NEt for NMe in the monomer salt leads to a significant reduction
in initial polymerization rate. When the counterion is changed the initial
polymerization rate decreases in the sequence $\text{BF}_4^- > \text{Cl}^- > \text{CF}_3\text{COO}^- > \text{Br}^-$, decreasing
by more than an order of magnitude. References 4: 3 Russian, 1 Western.
[289-6508]

MOLECULAR AND CRYSTALLINE STRUCTURE OF PHENYL- α -OXYCYCLOHEXYLPHOSPHINIC ACID CHLORIDE $C_6H_5(CYCLO-C_5H_{10}OH)P(O)Cl$

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 84 (manuscript received 21 Mar 83) pp 1052-1055

KARDANOV, N. A., TKACHEV, V. V., GODOVIKOV, N. N., and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; Department of Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka

[Abstract] The method of full x-ray structural analysis of single crystals was used to obtain unambiguous proof of the structure of phenyl- α -oxycyclohexylphosphinic acid chloride (II). Single crystals obtained by recrystallization from EtOH have MP 124-125°C and monoclinic syngony. The results of x-ray structural studies indicate that the intermediate product in the reaction of phenyldichlorophosphine and cyclohexanone is chloride (II). Crystals of the compound are constructed of H-bond associated molecules of transoid conformation relative to the P-C bond of the HO-C-P=O fragment. Figure 1; references 15: 14 Russian, 1 Western.
[289-6508]

MOLECULAR AND CRYSTALLINE STRUCTURE OF rel-(rR,6R)-5-THIO-5-PHENYL-2,4,6-TRIISOPROPYL-1,3,5-DIOXAPHOSPHORINANE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 84 (manuscript received 11 Apr 83) pp 1056-1060

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[Abstract] Previous studies of 2,4,6-trisubstituted 5-phenyl-1,3,5-dioxaphosphorinanes and their derivatives have shown that a stereoisomer may be in equilibrium with chair-conformation stereoisomers with equatorial substituents at the C atoms of the ring and axial or equatorial orientation of phenyl at the P atom. The new stereoisomer is found in 5-phenyl-4,6-triisopropyl-1,3,5-dioxaphosphorinane oxide, sulfide and selenide and has an intermediate dipole moment and other characteristics indicating twist conformation. The orientation of substituents and geometric parameters of this isomer have not been established. Therefore, the authors undertake precise determination of its structure. X-ray structural analysis of this C stereoisomer with melting point 124°C reveals the geometry of the molecule, coordinates of the atoms and bond

length and valent and torsion angles. The 6-member heterocycle does have twist conformation. The analysis of bond length and valent angle shows that they lie within the limits observed a previous report. Apparently the major contribution to destabilization of the molecule is that of the torsion interaction. Hence, equatorial substituents have the C⁴ and C⁶ atoms and the pseudoequatorial phenyl group in this isomer. References 11: 8 Russian, 3 Western.
[289-6508]

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ATTACHMENT OF NUCLEOPHILIC AGENTS TO VINYLIDINE DIPHOSPHONIC ACID, PART 2:
REACTION OF VINYLIDINE DIPHOSPHONIC ACID WITH PRIMARY AMINE, AMMONIA AND
HYDRAZINE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5,
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[Abstract] Chromatography on the strongly acid cationite Ku-2 in an aqueous medium was used to achieve separation of mixtures of products of the reaction of vinylidine diphosphonic acid with amines. Experiments confirm that the rate of movement of amphoteric molecules through the resin is higher, the greater the portion of the molecule which remains in the intragranular medium in noncation forms. Quantitative separation of the compounds was achieved. References 4: 3 Russian, 1 Western.
[289-6508]

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DERIVATIVES OF 3-CHLORO-4,5-BENZO-1,2-OXAPHOSPHOLANE

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[Abstract] A number of derivatives of 2-oxo-2,3-dichloro-4,5-benzo-1,2-oxaphospholane were synthesized in order to separate individual isomers. All of the derivatives of 4,5-benzo-1,2-oxaphospholane synthesized were hydrolytically unstable. References 3 (Russian).
[289-6508]

REACTIONS OF DIAZAPHOSPHOLS WITH ISOCYANATES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5,
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[Abstract] A study was made of the reaction of substituted diazaphosphols with isocyanates. 2-phenyl-5-methyl-1,2,3-diazaphosphol does not react with trichloroacetyl isocyanate at 20°C or benzoyl isocyanate when heated in CCl₄, whereas 2-acetyl-5-methyl-1,2,3-diazaphosphol reacts with trichloroacetyl isocyanate without a solvent in 7 days at about 20°C. The product is a new derivative of the two-coordination P atom, 2-acetyl-4-trichloroacetamido-5-methyl-1,2,3-diazaphosphol formed by [2+2]-cyclo attachment through an intermediate bicycle with migration of H from the C⁴ atom to the amide N with breaking of the C-N bond of the azaphosphatide ring. References 2 (Russian). [289-6508]

PESTICIDES

CHEMISTRY AND FOOD

Moscow NOVOYE V ZHIZNI, NAUKE, TEKNIKE, SERIYA: KHIMIYA in Russian No 5, May 84 pp 2-13, 64

[Annotation, first chapter and table of contents from book "Chemistry and Food", by Eduard Grigor'yevich Rozantsev, reviewer, V. B. Tolstoguzov, Izdatel'stvo "Znaniye", 27,040 copies, 64 pages]

[Text] Eduard Grigor'yevich Rozantsev is a doctor of chemical sciences, a professor, USSR State Prize Laureate, chief of the Biochemistry Department of the Moscow Technologic Institute of the Meat and Dairy Industry. He is the author of many scientific publications, patents, three monographs published in the USSR and abroad and two popular scientific pamphlets.

The USSR Food Program approved by the May 1982 CPSU Central Committee Plenum embodies a specific and multi-industrial approach to the solution of the food problem. This pamphlet examines what place chemical science and industry has in carrying out the Food Program, the role chemistry plays in the production, storage and processing of food products and problems of efficient nutrition.

The pamphlet is intended for lecturers, teachers and students of Peoples Universities and anyone interested in this problem.

Chemistry and Production of Agricultural Products

The 26th CPSU Congress, which promoted a broad program of social development of Soviet society and a rise in the welfare of the people, set the task of improving the supply of consumer food products. A special USSR Food Program was developed for carrying out this important task for the period up to 1990 and measures were planned for its accomplishment. The goal of this Program is to provide the people of the country with food products, dependably. The Food Program opens up a specific, multi-industrial course for the solution of a serious economic and social-political task. In it, plans for the development of many branches of the national economy are linked and united in a single agroindustrial complex, the functioning of which is subordinated to a general final goal--a substantial rise in the production of high-quality food products and bringing them to the consumer. Agriculture, land reclamation and water resources management, the chemical industry, agricultural machine building, agricultural construction, the biological industry, the transport of agricultural products, the storage of agricultural products, processing of agricultural raw materials, commerce and scientific protection enter into the composition of the agricultural complex.

The USSR Food Program provides for a definite rise in the efficiency of agricultural production and all branches of the agroindustrial complex and a sharp turn toward intensive methods of running the economy. A large-scale capital investment of 233 billion rubles was appropriated in the course of carrying out the Program in branches of the complex, and this will enable 70 kg of meat and meat products, 19 kg of fish and fish products, 340 kg of milk and milk products, 45.5 kg of sugar, 13.2 kg of vegetable oil, 135 kg of vegetable and melon crops and 70 kg of fruits and berries per capita per year to be produced toward the end of the 11th Five-Year Plan.

The chemical industry, the polymer material industry, agrochemistry, biochemistry, the mineral fertilizer industry, and chemical agents for plant protection play a role in the realization of the planned Program. Many complex chemical problems have had to be solved in the fish, food, meat and milk industry related to the processing of new forms of raw materials, an increase in the quality of prepared food products and a decrease in their loss in storage and transport processes.

In 1983 USSR agriculture will obtain 26.5 million tons of mineral fertilizers, and in 1990, 32 million tons, converted to 100 percent nutrient substances. Simultaneously, the production of chemical agents for control of harmful insects, rodents and weedy plants will be developed at a rapid pace.

Simultaneous use of mineral fertilizers with chemical weed killers and pest killers in conjunction with advanced agricultural technology is the most important resource for increasing the field productivity, a powerful lever for intensification of agricultural productivity in any agricultural region of the USSR. "Expenditures for fertilizers," wrote V. I. Lenin, "is the most accurate statistical criterion of the degree of intensification of agriculture." Calculations show that every ruble spent on chemical fertilizers when used properly gives additional agricultural production of not less than 1.5-5 rubles, and in addition considerably increases its quality and markedly decreases labor costs for growing the crop.

The basic forms of mineral fertilizers manufactured in the USSR provide the biochemical requirements of different agricultural crops for vitally important (essential) compounds of nitrogen, phosphorus and potassium and also sulfur, molybdenum, copper, cobalt and other trace elements.

It is impossible to produce nitrogen fertilizers without a strong nitric acid and ammonia industry. Potassium nitrate, urea (carbamide) and ammonia are among the most important nitrogen fertilizers. Considerable energy expenditures are required to obtain nitrogen fertilizers. From this one may conclude that modern agriculture cannot develop successfully without accelerated development of energy. Even now, mankind expends more energy in the form of fossil fuels per unit of arable land than is obtained from it in the form of food products.

The production of phosphate fertilizers also requires much energy. The USSR produces a rather wide product assortment of such fertilizers. Phosphorite meal, dicalcium phosphate, superphosphate and double superphosphate can belong to this group. Apatites and phosphorites, reserves of which are rather large in the USSR, serve as raw materials for their industrial production.

In contrast to nitrogen and phosphorus fertilizers, potassium fertilizers require almost no chemical treatment before application to the soil, because practically all potassium salts are absorbed excellently by root systems of plants. Potassium sulfate and chloride, deposits of which the USSR also has, are most effective.

Chemists continue to work on improving mineral fertilizers in the direction of development of complex and highly-concentrated preparations, the use of which lowers labor costs for applying them to the soil, decreases expenditures for their transport and storage and raises the total agricultural production.

Even at the present time USSR industry produces different complex fertilizers, including several nutrient elements, for example ammophos, diamphos, potassium nitrate, nitrophos, nitrogen-phosphorus-potassium fertilizer, etc. So-called ultraconcentrated fertilizers are in the developmental stage.

Microfertilizers, the composition of which included copper, zinc, cobalt, molybdenum, manganese, boron and iodine compounds, were developed also as the result of detailed biochemical research, because the ions of these elements are vitally necessary to plants for their normal development and maturation. Microelements are necessary for synthesis of enzyme systems of plants (biological catalysts), without which not a single biochemical process is possible.

The use of microfertilizers on fields in the USSR provides not only an appreciable but also a stable economic effect on the cultivation of forage plants, vegetables and other agricultural plants. For example, the application of boron compounds to the soil increases the yield per hectare of land by 20 quintals of sugar beets, 30 quintals of vegetables, and 50 quintals of fodder crops.

It was indicated in the Food Program that the production of highly concentrated and complex fertilizers in 1990 will reach not less than 90 percent of the total volume of fertilizers produced in the USSR, and beginning in 1988, all fertilizers will be produced only in granulated or coarse-crystal form with the exception, of course, of phosphorite meal. In addition, expansion of production of complex fertilizers based on superphosphoric acid is planned.

It would be erroneous to believe that complete provision of plants with essential elements by means of mineral fertilizers causes maximum possible yield to be obtained. On well-fertilized soils not only does rye form ears vigorously, but weeds also grow very well.

It is interesting to follow the dynamics of the growth of crop productivity, for example of labor productivity in agricultural production of economically developed capitalistic countries by taking as 100 percent the labor productivity in 1900. The rise in labor productivity in 1940, according to R. F. Norman's data, comprised 157 percent, in 1970, 575 percent, and in 1975 it reached 687 percent. It is interesting that up to the 1940's the rise in labor productivity was chiefly due to the use of mineral fertilizers and pesticides, but since the 1970's the efficiency of production has grown exclusively because of the incremental use of pesticides, especially herbicides (weed-control agents).

It is not surprising that the use of chemical agents for plant protection has steadily grown throughout the world, and together with this, the significance of chemistry itself for agriculture has grown.

In the USSR the supply of pesticides has been set to reach 680,000 tons in the 11th Five-Year Plan and 790,000 tons for 1990 with simultaneous expansion of the production of more effective pesticides and weed killers.

According to forecasts of specialists, the rise in yield because of pesticide use must be expressed as an amount not less than twice exceeding that achieved up to that time. And on the other hand, use of fertilizers without a pesticide leveler leads to vigorous growth of pests and diseases and to an outbreak of "green fire".

Every ruble expended for pesticide production yields a profit, because of the increase in the volume of agricultural production, of 10 to 100 rubles, depending on the kind of agricultural crop. The correct use of pesticides sharply increases the labor productivity of collective farmers and agricultural workers and allows full use of complex mechanization of labor-consuming work.

At the present time as the result of intensive biochemical research many fine details of the mechanism of the biological action of different pesticides on the plant and animal organism have been elucidated. In the whole world a large number of new different-purpose pesticides are being developed and made available for sale. Research is being conducted for the purpose of obtaining substances with a maximum low toxicity for mammals, because it is precisely such pesticides which find greatest demand from producers of agricultural products.

Intensive work is being conducted in the USSR on improving and broadening the product assortment of pesticides for different purposes. The decision was made to withdraw from use especially stable and toxic preparations, for example DDT, thiophos, arsenic preparations, mercaptophos and several others. As the result of these measures, the average toxicity level of pesticides and weed killers used in USSR agriculture has decreased by a factor of five.

Of the enormous assortment of pesticides of practical importance which are used in agriculture at the present time, one can mention first of all insecticides, agents for exterminating insects; acaricides, which kill herbivorous mites and ticks; nematocides, agents for control of round worms; limacides (or molluscicides), compounds designed for exterminating slugs and snails; aphicides, to be used against aphids; rodenticides, to be used against rodents; fungicides, bactericides and viricides, agents for controlling plant diseases; herbicides, poisons for exterminating weeds; defoliants, to be used for removal of leaves; desiccants, which produce drying of plants at the root; and growth regulators, compounds affecting the growth and development of plants.

Chemical control of the biosphere shows that at the present time about 1 million tons of DDT continue to be cycled in the natural environment, contaminating practically everything. The introduction of 1.5 million tons of DDT into the biosphere in this way in actuality started degradation of the very evolution of the biosphere. Another stable pesticide is hexachlorocyclohexane, constantly observed in food products; it is observed in human fatty tissue, kidneys, the liver and the brain and even in mother's milk.

There is no doubt that pesticides and weed killers harm the environment, but if the chemical war against insects were to be stopped, millions of people would be doomed to death by starvation. The use of a large, constantly changed product assortment of pesticides is a necessary measure, for more than one-third of the world harvest is lost annually to disease, insects and weeds. Even now, according to United Nations data, the annual world damage brought to agriculture by diseases, insects and weeds is calculated at 70 billion dollars!

It is well-known that considerable attention is paid in the Program to accelerated production of livestock. A specific task was posed--to bring up the average production of meat in the 11th Five-Year Plan to 17.5 million tons, and in the 12th Five-Year Plan, to 20.5 million tons and to increase milk production to 104-106 million tons and egg production to 78-79 billion eggs, respectively. It is proposed to increase considerably the network of enterprises for production of biological preparations for livestock and it is planned to raise the rate of output of feed preservatives and stabilizers. In 1985 not less than 110,000 tons and by 1990, 380,000-400,000 tons of them will be produced and sent to kolkhozes and sovkhoses. Industry also plays a very serious role in carrying out this grandiose program of chemical science.

The most varied pesticides and weed killers have found wide use in livestock raising as feed additives, preservatives, antioxidants, biological preparations and regulators of the growth and development of young animals.

The use of different food additives increases the efficiency and economy of the biological utilization of protein and other biologically valuable ingredients. As examples of efficient and cheap feed additives one can mention urea, synthetic methionine, lysine and tryptophan, vitamins and trace elements (essential nutrients). Finally, this provision of feed rations with protein is most important, inasmuch as protein imbalance involves an enormous overexpenditure of feed, reaching 50 percent above the norm. Yeast, microbalances biomasses, hydrolysates of keratin-containing raw material (feathers, wools, horns, hooves, etc.) are recommended favorably as protein supplements.

It was shown that introduction into the mixed feed of 5 percent of feed feathers enables the weight gain of young stock to be increased by a factor of 1.5-2 in the raising of swine for meat and the fattening time to be reduced by a month. For each ton of feathers used to fatten poultry, an additional two tons of poultry meat or 35,000 eggs are guaranteed to be obtained.

Keratins are not digested in the stomach of animals but contain in their composition all indispensable amino acids which are of great value as feed supplements. Chemical treatment of horns and hooves, those large-scale waste products of the meat-picking industry, leads to the production of a valuable protein concentrate for fattening farm animals, for each kilogram of hydrolysate contains about 970 g of amino acids.

The use of synthetic urea as a feed additive enables up to 25 percent of valuable feed protein to be saved, and in this case for each ruble of expense, stock breeders can obtain an additional production worth 10 rubles, and the addition to feed of defluorinated phosphate has a still larger economic effect.

The use of chemical preservatives in a number of cases enables the losses of succulent and wet feeds during storage to be reduced by 50 percent. Waste-products from several chemical processes can also be used as preservatives: sodium bisulfite, salts of phosphoric acid and carboxylic acids. The use of formic acid for this purpose, for example, increases the milk yield by 12 percent and simultaneously reduces expenditures for feeds.

Still more beneficial effects can be achieved by introducing synthetic antioxidants--santoquin, tert-butylhydroquinone, ionol, tert-butylanisole, etc., into several forms of feeds. Low-quality fats used in the preparation of feeds for poultry are oxidized rapidly, and in addition essential components of feeds, for example vitamins, enzymes and indispensable amino acids are also subjected to conjugated oxidation. If in all, 0.01 percent of antioxidant is added during preparation of the feed, its initial biological value is retained. Thus, if 0.01 percent of ionol is added to the feed of broiler chicks, their mortality from vitamin deficiency is reduced from 50 to 5 percent.

Analogously, it is possible to stabilize hay, silage, lucerne hay and other dry plant fodder. The original nutrient value of fodder is retained almost completely by means of antioxidants in the stabilization of fish or bone meal and the tendency of pesticide products to undergo oxidative decomposition in them is avoided.

Trace elements required by the animal organism for biosynthesis of specific enzymes occupy an important place among necessary feed additives. In conformance with the Program, it is planned to increase the procurement for the agroindustrial complex of manganese, zinc, cobalt, copper and boron salts, which apparently in some cases will utilize discharges from industrial enterprises.

Stock breeders place great reliance on biologically-active preparations which raise the fertility, endurance and resistance of animals to different diseases, accelerate the growth of young animals and discourage blood-sucking insects. The use of growth stimulants opens tempting prospects for intensification of livestock raising; however, the majority of known preparations of this kind are dangerous to human health. An interesting method for accelerating the growth of young animals has been proposed by English biochemists. The preparation somatostatin developed by them is a natural antagonist of the somatotropic hormone (growth hormone). Therefore, if the biosynthesis of somatostatin is blocked in the hypothalamus of an animal, growth hormone is produced in the animal without impedance, and animals gain weight twice as fast as usual.

Biostimulants, vitamins, hormones, enzymes, antibiotics and tissue preparations increase the productivity of farm animals and poultry and enable feed to be economized. Tissue stimulants prepared from the fresh spleen of cattle appeared to be especially effective. Encouraging results are obtained in the use of the preparation as a growth stimulant of calves and pigs. A method has been developed by Leningrad scientists for aerosol use of a tissue preparation for treating several thousand chicks at once. Due to the biochemical action of the preparation, the loss of chicks from infections has been reduced by 4 percent and the increase in weight of chicks has increased by 8 percent in comparison to the controls. The economic effect of the use of the preparation in

incubators of broiler farms for each thousand hens comprises 170 rubles, whereupon each liter of preparation used for treatment of the chicks provides an additional output of 6 tons of meat. It is interesting that the amount of preparation obtainable from 1 kg of spleen is sufficient for treatment of 120,000 broilers!

Livestock breeders recently obtained a new effective biological preparation, by means of which it is possible to control intestinal bacillus, *Staphylococcus aureus*, pathogenic paratyphoid, brucellosis, the virus of foot and mouth disease, malignant anthrax spores and pathogenic fungi. This preparation is cheap and convenient to apply.

The Food Program includes vast measures for land reclamation. By 1985 the area of land to be irrigated is planned to reach 20.8 million hectares, and by 1990, 25 million hectares. In this time the areas of reclaimed land will be expanded to 19 million hectares. At first glance it is hard to imagine what help chemistry would be in such a labor-consuming enterprise as the construction of land reclamation-irrigation projects. However, here also the role of synthetic materials created by chemists is difficult to overestimate.

The use of polymer films in agriculture and hydroengineering construction alone has a great economic effect, which for each ton of skillfully used film comprises not less than 4,000 rubles of profit.

Indeed, 137 billion m³ of water in the USSR is used for irrigation purposes; a considerable part of the water at the same time simply goes into the soil and thus is lost without being of any use. This water can be saved if waterproof shields and screens, compartments and cofferdams are used with films in the construction of earth and rock-fill dams, in the lining of enclosures for rice fields, for the paving of the bottom in the excavation of canals and irrigation ditches and in the maintenance of fine hydroengineering construction.

Film materials are used not less effectively in the cultivation of vegetables, fruits, berries and flowers in a protected soil, the mulching of soil, the production of fodders, the construction of hotbeds, greenhouses, different cultivation structures and hothouses of lightened constructions. Polymer materials are widely used in the manufacture of packages and containers for storage and transport of agricultural products, pesticides, weed killers and mineral and organic fertilizers.

Chemists are constantly increasing the product assortment of polymer film materials necessary to agriculture and other branches of the agroindustrial complex: already film for conservation of succulent fodders, film containers with gas-permeable membranes--inserts for storage of fruits and vegetables in a regulated gas atmosphere, high-strength films for warehouse and storehouse installations, light reflecting and composite strips for soil mulching have found acceptance.

In addition to films, chemistry offers agriculture a large product assortment of polyethylene and polyvinyl chloride pipes, flexible smooth and crimped hoses for liquid and loose materials, for drainage, irrigation machinery, sprinkling

installations, milking machines, dismountable hothouses and storehouses. Many polymers are used in the manufacture of dishes, reservoirs, components of machines and mechanisms, screens, binder twine, strips, plastic glass materials and articles, reinforced metal screens and other things necessary to modern agriculture.

Now no one needs to be convinced that the efficiency of the national economy on the whole and in each of its branches in many ways is determined by the level of chemicalization, and this level depends not so much on the volume of chemical products produced as on the ability to use this production and on the level of the standards of production and most of all chemical standards of production of field workers.

In other words, "for a good hunt, it is not enough to buy a good gun, but it is necessary first of all to learn how to use it". In order to make maximum use of all the advantages of chemicalization, it is necessary to popularize chemical knowledge broadly by using print, radio and television; it is necessary to improve constantly the quality of chemical preparation of agricultural specialists at all levels, to organize chemical information centers in different agricultural regions of the USSR and, finally, to expand and deepen considerably the teaching of chemical disciplines in schools, technical schools and colleges.

By visualizing in a general outline the role of chemistry in the matter of a considerable increase in the volume of agricultural production, we must not forget that the final goal of the Food Program consists of reliable provision to the people of the USSR with all kinds of food products. Problems of the quality of food products acquire especially important significance in this final step, because the health, work activity and welfare of the Soviet people depend to a considerable degree on the quality of food.

An improvement in the quality of agricultural raw materials and processed products enable the profitability of all branches of the agroindustrial complex to be improved and serves as an important factor in increasing the efficiency of the work of enterprises of the food, fish, meat and milk industry, trade and other links of the economic mechanism.

What is the role of chemistry in the work of preserving food products, what is food and how to determine the quality of food products, what are the biochemical functions of food products, what is excessive and insufficient nutrition, what are the possibilities of modern chemistry in the matter of improving the quality of food products and the perfection of food technology--these and other aspects of the food and nutrition problem will be examined in the following sections.

Contents

Chemistry and Production of Agricultural Products	3
Chemical Protection of Food	13
Full-Value Complex	28
Chemical Quintessence of Food	29
Catalysts of Vital Functions	34
Improbable but Obvious	41
Cookery, Chemistry and Nutritional Quality	43
Literature	63

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PETROLEUM PROCESSING TECHNOLOGY

DRILLS ADVANCING ON STEPPE

Moscow PRAVDA in Russian 17 Jul 84 p 1

[Article by G. Sazonov, PRAVDA correspondent, Orenburg and Ural Oblasts]

[Text] Karachagansk. The name of this small Ural settlement in the Kazakhstan steppe is heard more and more often in conversations of Orenburg gas producers. Deposits of gas and condensate have been found nearby. Construction has begun at the Karachaganak Site. Those participating in the construction--worker collectives of sections of the Ministry of Construction of Petroleum and Gas Industry Enterprises and the Ministry of the Gas Industry--have pledged to put projects of this experimental industrial business development into early operation.

The shadow of the "MI-8" helicopter, which was headed for Karachaganak, glided quickly along the glassy surface of the Ural and the carpet of river forests and fields. About an hour passed and in the illuminator I saw the sandy steppe rushing to meet us, a number of multi-colored trucks and several derricks.

"Here is the heart of the deposit," noted I Kurmygin, director of "Orenburggazstroy", when we arrived at the construction site of a plant for complex preparation of raw material. "Gas and condensate from the well drilling will come here in October."

The plant comprises a number of structures. Raw material goes from large reservoirs to the gas-reprocessing plant in Orenburg. At the beginning of the year, the builders allowed construction to fall behind, but then they made up for the lapse. This indicated the skill of the brigades, who, under complex weather conditions, have managed to prepare the ground work for the equipment.

"We have promised to complete our projects at the plant a month ahead of schedule," announced V. Volkov, supervisor of the complex crew. "This is possible."

It is not easy to build in the open steppe, far from lodgings. It is not, and there are often dust storms. And, nevertheless, the majority of the worker collectives do outstanding work.

I. Ivanov's brigade continually provides the site with concrete from a concrete-mortar center and work succeeds on the installation of compressor and other projects.

It will also be necessary to set up a great amount of equipment. This has been entrusted to the "Vostokmontashgaz" trust collective from Al'met'evsk, which so far is developing slowly. The builders believe that it would be better to organize the installers' work, to provide their mechanical equipment. The same can be wished for the collective staff of installers, who work on chemical protection.

Geologists of the Ural oil-exploratory expedition discovered the Karachagansk deposit in the fall of 1979.

Having discovered gas with a high hydrogen sulfide content, they joined together to form the "Orenburggazprom" organization, which has solid experience in dealing with similar raw material.

"The Karachagansk deposit," related V. Alekseyev, head geologists of the gas-industry administration, "can be compared with the Orenburg gas-condensate site in value. But there are differences. In particular, there is a higher sulfur content, and there are paraffins which are valuable raw material for various sectors of industry. The geologists' task is to develop a geological model of the new site and to aid the workers in creating methods to obtain the raw material."

Those who were to become the exploitation workers acted prudently: at the very first well in use, they organized a research complex. Using instruments, operators and engineers of the local administration, as well as associates of two scientific research institutes, are studying the features of the gas and condensate and are determining ways to obtain them.

While the drills advance still further into the steppe, worker collectives of the Ural oil-exploratory expedition and the Karachagansk administration of drilling must transfer 14 wells to workers at the ongoing project. Counter-boring at the site must be accelerated.

The "MI-8" gathered altitude again. The helicopter flew over the course of the site toward Orenburg. This has three strings of pipelines, through which the raw material will enter the gas generator structure. The builders here are still behind schedule.

The "Orenburggazzavod" organization is conducting the third reconstruction of the gas complex in order to receive and reprocess Karachaganak raw material. Last year, the administration of the "Orenburgenergostroy" construction did not compare with the reconstruction plan, and now is slowly catching up. In short, the construction collective staffs must operate more smoothly.

And one more thing. The development of a new site, undoubtedly, will give a second life to the city of Aksay, a rayon center of Ural Oblast. So far, the lodgings and social-cultural life projects are progressing slowly.

It was as if the powerful torch, which blazed up at the first well, symbolized the great strength contained in its depths. To subject it to the will of man is not an easy task. Today's structure is only the beginning of a large project.

MILLIONS WITHOUT PROFIT

Moscow PRAVDA in Russian 17 Jul 84 p 2

[Article by V. Kuz'mishchev and M. Odinets, PRAVDA special correspondent, Belaya Tserkov-Moscow]

[Text] If there is a conversation about a frozen, delayed construction project and immobilized equipment in warehouses, then you can be sure that the customer will put all the blame on the builders, while they will point their fingers at the industrial department of the USSR Gosplan (State Planning Commission); they say it will not supply the money. While at the Gosplan they assert that they did allot the means, issuing from trust capacities and in consonance with the customer's orders. What evolves is a sort of vicious circle, around which one could travel for eternity, acquiring newer and newer details and proofs of the correctness of guilt of each of the three main participants in construction. And if one cannot get off it, then it is hardly possible to receive a reply to the classical question. "Who is guilty?"

We had the occasion to go around this circle twice. The first time was in Kiev on the republic level, and the second time was in Moscow. And we asked the same question: how, in the city of Belaya Tserkov, could more than 100 million rubles of imported equipment be accumulated and for the fifth year lie like a dead weight in warehouses?

The history of this question was generally well known. In the 10th Five-Year-Plan, the USSR Ministry of Oil Refining and Petrochemical Industry determined the time periods for the installation of the second tire plant in Belaya Tserkov. Initially, it was planned to construct it in 1978-1980 on Soviet equipment, and then in 1980-1981 on imported equipment. The time periods have passed, but there is no plant, and there are 14 hectares on which there are containers of equipment purchases abroad. They lie underneath a roof and out in the open.

All of this makes one think? if the time periods have been shifted with unusual ease, and it is now planned to introduce only one shop for preparing rubber mixtures in 1985 and to put out the tires themselves in 1987, doesn't this indicate that there was not an urgent necessity to spend the money?

Let us imagine how everything should be, ideally. We shall begin with the fact that the former Deputy Minister of the USSR Oil Refining and Petrochemical Industry, M. Parfenov, by whose initiative the equipment was purchased abroad,

of course, should analyze predictions and ascertain the amount and type of coverings that have to be produced in future years, and should not act according to the rule "a supply will not weigh down your pocket". If tire production really had to be accelerated, then the time periods of constructing the plant should be shortened as much as possible. In any case, they could have been lengthened by 1 year or 1-1/2 years, to that time when the last container of equipment was supposed to come in (and had arrived). And, most importantly, a micro-rayon with an area of 14 hectares should not have been created from containers, but the equipment should have been assembled in already prepared industrial buildings.

Ministries base their orders on the value of precisely such an ideal version.

At the first glance, there was a basis for this ideal situation. Two construction trusts were operating in Belaya Tserkov and together they performed work for approximately 30 million rubles a year. But who, if not the deputy minister, should know that, in the first place, the builders were also continuing then to work on other projects of the Belaya Tserkov Industrial Organization of Tires and Rubber-Asbestos Products, and, in the second place, they could not begin construction mainly because there still was no project. It appears that the exact same incident occurred as when the cart was placed before the horse.

In September of 1976, a resolution was adopted for the purchase of imported equipment. While negotiations went on for 3 years and contracts were drawn with foreign firms, planners of the Ministry of the Oil Refining and Petrochemical Industry were not dozing; they were enacting the first project on the imported version of equipment. The cost of the project almost doubled because of this, and so another 2 years have gone for "settling" the problem in the USSR Gosplan and Gosstroy (State Committee for Construction Affairs). They did not approve the project until April of 1979, right at the time when the first containers with the inscription "Tekhmashimport" had arrived at the future construction site.

It would benefit us to stop at this moment and attempt to learn a lesson from it. After all, it has already become a bad rule that other ministries first receive the technical part of the project and the equipment itself from their suppliers and only then do they prepare the construction part.

However it was there, the time had come to set to work. There was a project, and two trusts gathered momentum to construct the first tire plant and other projects of the Belaya Tsetkov Organization. They should have joined and switched to construction of a new plant. Then in 4 years, as was planned, the task could have been completed. But....

But the resources necessary for construction were not provided.

And here we enter the vicious circle, attempting to figure out how it turned out that the capital for purchasing equipment could be spared, while sufficient means for putting it into operation were not allotted.

Who did not allot them? We are attempting to set forth the positions of each side. Representatives of the customer--Director of the Main Petrochemical Industry of the Ukraine, G. Lesnichiyy, and Head of the VPO [Production Association] "Soyuzavtoshina", M. Mitrofanov, assets, "The main reason is that the industrial department of the USSR Gosplan allotted little capital. With our own efforts, we, one could say, out of enthusiasm, set up equipment costing 35 million rubles for the first tire plant. Now, after representatives of the KPK, CPSU Central Committee, were in Belaya Tserkov things have begun to move."

A. Shchepetil'nikov, contractor and minister of UkSSR Industrial Construction, commented, "Every year, instead of 30 million, they allot us around 10. For this reason, the second trust has had to relocate, since it had nothing to do in Belaya Tserkov. The other trust, "Belotserkovkhimstroy", was forced to take other orders so that it could have enough work for its capacity."

M. Sukhoruchenko, director of a subdivision of the capital construction department of chemistry of the USSR Gosplan, said, "Well, that's protocol. You see how much the USSR Ministry of Industrial Construction ordered, and here is how much we allotted. Of course, the sums have been reduced sometimes, but not enough to be reflected significantly in the course of the project."

A. Pankov, deputy minister of USSR Industrial Construction said, "We accepted practically the same amounts into the plan as the Ministry of the Petroleum Refining and Petrochemical Industry ordered. Here are the yearly statements... All of their orders do not amount to a third of the sum necessary to start up production."

The circle has been closed. It is as if there are no guilty parties.

Well, let's return to the starting point. Another customer, Y. Sivakov, a deputy minister of the Oil Refining and Petrochemical Industry, comments, "Why did we ask for too little? You see, we are limited in capital for the development of industrial sectors. And the project in Belaya Tserkov was not of the utmost importance in those years. A tire shortage would not be noticed..."

In other words, our guesses were correct. Taking the initiative on the purchase of equipment abroad, M. Parfenov did not pay particular attention to predictions about industrial development.

However, this last conversation was necessary, so to speak, to clear the conscience, since we have one figure available which explained a great deal; a dead weight lies on 845 million rubles of strictly imported equipment at the enterprises of the Ministry of the Oil Refining and Petrochemical Industry. So Belaya Tserkov is not the only place in the world. For directors of this ministry, where there is no use, there are plenty of means. There is such a range...

Nevertheless, we are now speaking of a particular instance, since a situation has arisen which will undoubtedly lead to the fact that, in a few years, the same story will be repeated with another enterprise. A sort of model of mismanagement is appearing.

Here are its basic outlines. First they prove that it is vitally necessary to build the plant. Funds and currency are allotted. Equipment is stored in warehouses. Then it is explained that there are more important construction jobs. And on the first project, the most attention is given to propriety. Then they suddenly recall and announce a construction job that is especially important. This means that work at the third project will be moved aside for a prolonged period.

So, in the final analysis, losses cost the national economy much more than the dead equipment.

Those personally guilty of the fact that the money is not producing anything are primarily the directors of the Ministry of Oil-Refining and Petrochemical Industry, who acted according to the doubtful rule "a supply will not weigh down your pocket". Although their actions should have been controlled by the USSR Srobybank (Construction Bank) and Party and other organs.

But also present at the chain reaction source of freezing of construction jobs and future failures were directors of construction ministries and of the industrial sector department of the USSR Gosplan, who, knowing well that sooner or later the problem would have to be solved, lived only for today.

There is a wise saying, "to remember is to foresee". If, in the department of chemistry of the USSR Gosplan (director M. Vasil'yev), they found the courage in their time to recall that, with their blessing, capital was allotted to purchase equipment abroad and therefore they are equally responsible for its use, then they would probably have attempted to alter the present critical situation. But this requires much more effort than building a roof out of numerous papers.

One could talk as much as one wanted about shortcomings in the planning of capital investments, the failure of plans for introducing projects and the disruption of procedure in filling orders, but it will just be words until the strictest personal responsibility is established for economical validity of drawn contracts. A control system which includes resolute decisions is needed. From those who, as if from the sidelines, for years have observed mismanagement and the fact that millions of rubles are not making a profit, a stricter Party demand is needed.

12473
CSO: 1841/354

ARMOR FOR PIPELINES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Aug 84 p 1

[Article by V. Lagovskiy]

[Text] Every year, hundreds of kilometers of new oil and gas pipelines are laid in our nation, and those in existence are repaired. In order to protect them from corrosion, insulating materials are needed which are able to resist heating and cooling, corrosive mediums, wear and high tension. Polymeric coverings, which possess such unique properties, are being developed at the Moscow Institute of Petrochemical and Gas Industry imeni I. M. Gubkin.

"Attention! Accelerator in operation!" flashes the sign on the massive door. Located behind the door is a research testing stand of the department of physics and chemistry, where A. Chebatorevskiy, senior science associate and one of the creators of the new materials, is directing an experiment. There, behind the concrete walls of the laboratory, flows of charged particles pierce polymeric coating. Why?

"To impart the properties we need," explains the scientist. "Radiation re-constructs the entire inner structure of the polymer. It is as if it sews its molecules to each other. As a result, the coating's durability more than doubles, and its resistance to cracking rises several thousand-fold!"

Polymers with such characteristics would be useful in many sectors of industry, but for insulating oil and gas pipelines, which lie under the ground for decades, durability alone is not enough.

"We are aiming for warm and corrosive stability, introducing various additives," says A. Chebatorevskiy. "What kind? That is still a secret. But judge for yourself how effective they are."

Several graphs are lying on the table. They are the results of experiments for Japanese, American and Soviet insulation. All parameters, which usually indicate quality and reliability, are 1-1/2-2 times higher for our coating. But, aside from this, it has one more valuable feature...a memory.

I have a piece of insulation in my hands; it is smooth, black tape, which was just subjected to an unusual treatment. First it was irradiated by a flow of charged particles, and then it was stretched. But the laboratory assistant puts the insulation toward the flame of a gas burner, and the tape shrinks!

"The same thing will also happen on the run of pipeline," explains A. Chebatorevskiy. "When the tape, which is wound around the pipe, is heated so that its inner layer will melt and adhere to the metal, the outer layer will shrink, greatly increasing the reliability of the fusion. To simplify it, we can say that radiation, fusing together polymer molecules, also arranges them in a particular order which they "remember" when heated."

But while tape can be wound around the pipe fairly easily, how can components of more complex molds be protected from corrosion, like sealing fittings-- various stopcocks and bolts?

"A promising method has been developed for this: dusting of polymeric powders in the electrstatic field," relates the scientists. "Falling on the preliminary treated surface, the tiny grains melt and form a band which is 0.01 to 3 millimeters in width. It protects the component."

"We know about the method itself," I. Dmitriyevskiy, prorektor of scientific work of the institute and doctor of geological mineralogical sciences, entered the conversation. "But there was no polymer which possessed properties which would make it possible to be used for oil and gas pipelines. In addition, it was important to search for chemical agents which, at the moment that the powder and radiation were applied, would fuse the polymer molecules together, increasing its stability."

Now, scientists of the Gubinsk Institute and colleagues from the Institute of Chemical Physics of the USSR Academy of Sciences and the Kazan Production Association "Organic Synthesis" have created several of these materials. And at the same time, they have proposed a completely new method of producing powder from them. It makes it possible to immediately avoid two time-consuming and inefficient stages of the traditional treatment of plastics--granulation and grinding-- the "grist" of produced granules. The finest powder is obtained directly from the melted polymer mass. Simply because of this, the cost of 1 ton of it decreases by 85-270 rubles.

The work performed is an enormous task, both scientific and practical. There is a plump folder in front of me which is full of the authors' documents received during the development of recipes and techniques for preparing new insulating materials. There are more than 50 of them. The materials themselves have proven their reliability, by having withstood every kind of test, including natural ones, in conditions of a real run of line. Now it is a matter of industry. Unique polymeric materials are not only needed by gas producers and oil producers. Polymers will be able to protect the most varied machines and constructions from corrosion, from bridges to light automobiles and technology for everyday life. And, as scientists believe, it is possible to introduce these materials and progressive energy-saving techniques of their production without supplementary capital expenditures on equipment which already exists.

UDC 547.216+547.217.1:542.941.8+542.952.52

CATALYTIC CONVERSION OF CUMENE UNDER HYDROGEN PRESSURE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 3, Mar 84
(manuscript received 14 Aug 82) pp 586-588

KRUPENYA, N. G., ZHUBANOV, K. A. and DZHANDARBEKOVA, A. K., Kazakh State
University imeni S. M. Kirov

[Abstract] Cumene is one of the hydrocarbons subjected to reforming to make high octane gasolines. Results are presented on a study of the effects of various factors on cumene reforming at high hydrogen pressures. Cumene conversion in the presence of AP-64 catalyst (alumina-platina) is first order in respect to cumene and hydrogen. Conversion depends largely on process temperature and hydrogen pressure. Figure 1; references 2: 1 Russian, 1 Western. [314-12765]

UDC 677.494.021:543.544.45.271.2

GAS CHROMATOGRAPHIC DETERMINATION OF CONTENT OF HARMFUL SUBSTANCES IN AIR OF INDUSTRIAL LOCATIONS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 83 (manuscript received 13 Jun 83) pp 47-48

PANTAYEVA, V. M., BASKAKOVA, T. I., KVASHA, N. M. and KRENDELEVA, T. A.

[Abstract] Conventional chemical-colorimetric methods for analyzing air in industrial locations producing synthetic fibers are difficult, lengthy, require a variety of reagents and often lack the required selectivity. In the present work a universal gas chromatographic method for determining the majority of organic substances present in air was developed. Low boiling, volatile components are first concentrated by adsorption on a porous polar polymer, while the higher boiling components are concentrated in a small quantity of solvent in a porous plate absorber. Analysis is carried out by chromatographic separation in a single column filled with 20% hexakis-(2-cyanoethoxy)hexane on Chromosorb W or Chromatone N. The method is rapid, has high sensitivity, does not require toxic reagents and may be carried out in an automatic gas chromatograph.

References 11 (Russian).

[312-12765]

UDC 677.494.675-96.021.12

PROPERTIES OF POLYCAPROAMIDE FIBERS MODIFIED BY GRAFTED POLYACRYLONITRILE

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 84 (manuscript received 23 May 83) pp 32-33

SHALABI, S. E., AFANAS'YEVA, I. S., GABRIYEL'YAN, G. A. and DRUZHININA, T. V.

[Abstract] Grafting of polyacrylonitrile (PAN) on polycaproamide (PCA) fibers results in improvement of their light stability and makes them look more like wool fibers which is an important property in synthetic wool products. The grafting process was studied using PCA fiber with quaternary ammonium groups (QAG) and an activator-- $K_2S_2O_8$; this method gave highly effective grafting results without the formation of a homopolymer. Properties of thus-modified PCA fibers were studied. The grafting of PAN on PCA resulted in improved characteristics of the product: better light stability, thermal stability and more natural wool appearance.

[306-7813]

UDC 541.64:542.954

LOW TEMPERATURE SYNTHESIS OF POLYCAPROAMIDE COPOLYMERS GRAFTED WITH POLYDIMETHYLAMINOTHYLMETHACRYLATE

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 84 (manuscript received 5 Aug 83) pp 33-34

KHARDIN, A. P. (Deceased), ZHELTOBRYUKHOV, V. F. and TATARNIKOV, M. K.

[Abstract] The goal of this study was to develop a highly effective yet technically simplified synthetic method for grafted polycaproamide (PCA). The method was as follows: during the first stage PCA fiber was activated with 0.5-2% of aqueous H_2O_2 in presence of 10^{-2} to $10^{-4}\%$ $CuSO_4$ at 50-80°C for 30-60 min. Then the fiber was washed to remove excess H_2O_2 and Cu^{++} and treated with 20% aqueous solution of dimethylaminomethylmethacrylate at 20-30°C for 60-120 min. Next, the fiber was washed with ethanol for 12 hrs and the homopolymer was precipitated with acetone. This grafting was very effective (about 100%), the reagents are easily accessible and the method is highly recommended for practical application. References 5 (Russian).

[306-7813]

SYNTHESIS OF REINFORCED COMPOSITE THREADS BASED ON POLYMER MIXTURES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 84 (manuscript received 4 Oct 83) pp 35-37

TSEBRENKO, M. V.

[Abstract] A number of factors influencing the reinforcing effect of composite threads was studied: nature of the polymers being mixed, structures of extruded materials, conditions of orientational stretching of the threads, etc. It was shown that reinforcement produced a synergistic effect on the strength and the initial modulus. Evidently, ultrathin polyhydroxymethylene fibers are formed during the melting process in the other polymer. Addition of 10% of polyhydroxymethylene (PHM) to the polycapraamide (PCA) increases the strength of a thread 1.5 fold and the initial modulus 2.28 fold. This effect was observed during the formation of threads from molten mixtures of PCA-PHM, copolyamide-PHM, ethylene copolymerized with vinylacetate (EPVA)--PHM. Polymer mixtures with a well developed interphase layer and strong interaction of its components achieve maximum reinforcement at a low content of the dispersion phase polymer.. In absence of a strong interaction, the maximum effect is observed during a preferred formation of a dispersed phase of continuous ultrafine fibers.

Figure 1; references 20: 16 Russian (2 by Western authors), 4 Western (1 by Russian authors).

[306-7813]

FIRE RETARDANT CELLULOSEHYDRATE FIBERS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 84 (manuscript received 22 Dec 83) pp 37-38

IVANOVA, A. Ya., ZUBKOVA, N. S., TYUGANOVA, M. A. and GAL'BRAYKH, L. S.

[Abstract] Fire protective properties were imparted on cellulosehydrate fibers by synthesis of grafted copolymers of cellulose and polymethylvinylpyridine, followed by a treatment with phosphoric acid or by treatment with an aqueous solution of antipyrene T-2--the diamide of methylphosphoric acid. The treatment of cellulosehydrate fibers with antipyrene T-2 in presence of urea appeared to be the preferred route for imparting fire retardant properties. The energy of activation of thermal decomposition of fire-retardant cellulosehydrate fibers obtained from various antipyrenes were calculated. In other studies, it was shown that there exists a relationship between the apparent energy of activation of cellulose thermodestruction and the effectiveness of phosphorus containing antipyrenes. The energy of activation of the thermodestruction is lowered most drastically when hydrated cellulose is treated with the antipyrene T-2. This agrees well with the data on the effectiveness of the fire retardant properties of this antipyrene. References 6 (Russian).

[306-7813]

IMPROVED UNIFORMITY OF VISCOUS TEXTILE FIBERS OBTAINED BY ALTERING DRYING PROCEDURES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 84 (manuscript received 11 Oct 83) pp 40-41

KIRILLOV, A. D., SERKOV, A. T., SHEVCHENKO, A. S. and KALLER, A. L.

[Abstract] Nonuniform properties of viscous textile threads formed by the centrifugal method are the results of their formation conditions and those of the separation and drying. The thickness of the thread may be diminished by its drying "from inside out". In such case the internal layers of the thread should decrease along with the shrinking. This in turn should decrease the formation of rigid framework. The aim of this study was to verify the above assumptions. The data obtained supported these assumptions. During the drying process longitudinal shrinking of the thread takes place. When this is done by the usual method, the decreased volume of internal layers lags behind the shrinking of the external layers leading to the non-uniformity of the thread properties. During the drying process "from inside out", longitudinal shrinking and the decrease in thread volume occur concurrently, preventing the formation of a rigid frame. Figure 1; references 4 (Russian). [306-7813]

SYNTHESIS OF ANTIMICROBIAL CHEMICAL FIBERS AND FIBROUS MATERIALS CONTAINING QUATERNARY AMMONIUM COMPOUNDS AND THEIR UTILIZATION

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 84 (manuscript received 18 Feb 83) pp 42-44

VAYNBURG, V. M., SHAMOLINA, I. I. and VOL'F, L. A.

[Abstract] One method of obtaining textile materials with antimicrobial properties consists of modification of chemical fibers with surfactants (SA) containing quaternary ammonium salts (QAS). Some of the best known among them are: dimethylalkylbenzylammonium chloride (catamine AB), alkyltrimethylammonium chloride, alkylacyltrimethylammonium chloride, etc. To bind effectively the catamine AB to fibers and fabrics, precondensates of thermoreactive resins were used along with various dyes. Catamine AB could be introduced after digestion with a precondensate or during the digestive process. After this step the fabrics are thermally treated at 140-160°C for 2-3 min. These materials showed high biological activity and could be used for impregnating the disposable gauze pads or filtering materials in decontaminating air at the food processing plants, in production of amino acids and even in shoe industry, bookbinding activities, etc. Figure 1; references 14 (Russian). [306-7813]

FORMING FLUORINE-CONTAINING THREADS FROM VINYLIDENE FLUORIDE-TETRAFLUOROETHYLENE COPOLYMER BY DRY METHOD

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 83 (manuscript received 30 Dec 82) pp 13-14

VESAYTE, B. S., BEZPROZVANNYKH, A. V., LOGVINOV, A. I., MADORSKAYA, L. Ya. and VOL'F, L. A.

[Abstract] Until recently, wet forming was the preferred method for obtaining thread from fluorine-containing polymer solutions owing to the viscous-flow properties of the spinning solutions and the properties of solvents used. Now, however, the advantages of the dry forming method are available by using vinylidene fluoride-tetrafluoroethylene copolymer. Conditions are described for dry forming threads based on this copolymer and for the oriented stretching and subsequent thermofixation. The resulting threads have high strength and exceed all known fluorine-containing threads in resistance to double flexing. Figure 1; references 6 (Russian). [312-12765]

STUDY OF EFFECTIVENESS OF FIRE-RESISTANT ACTIVITY OF ANTIPYRENES FOR FIBERS OF AROMATIC POLYAMIDES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 83 (manuscript received 13 Jul 83) pp 18-20

IVANOVA, A. Ya., TYUGANOVA, M. A., GAL'BRAYKH, L. S., VOLOKHINA, A. V. and SOKOLOVA, T. S.

[Abstract] With the increasing use of new types of aromatic polyamide fibers, the need arose to increase their fire-resistance. Organophosphorus and chlorine-organic fire retardants were employed in the present work to increase the oxygen index of the above fibers. The fire-resistant effect of the modified fibers was found to withstand wet treatment during production if glycazone is added. Little loss in physical and mechanical properties was observed when organophosphorus antipyrenes were added, while significant loss was observed in the case of chlorine-organic retardants, making the former the preferred modifier. Figure 1; references 3 (Western). [312-12765]

EFFECT OF DEGREE OF POLYMERIZATION OF POLYCAPROAMIDE ON INDUSTRIAL GRADE
THREAD STRENGTH

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 83 (manuscript received
20 Jul 83) pp 20-21

GUSAKOV, M. Ya., YAKOVENKO, T. V., LATYSHEVA, Ye. K., ZAVAL'NAYA, G. I. and
OVDAK, A. P.

[Abstract] Increasing the strength of industrial-grade polycaproamide thread is an important problem for the national economy, and it is normally met by increasing the degree of polymerization of the polymer. In the present work, a simple mathematical formula was derived which correlates thread strength with degree of polymerization. Numerical coefficients in the formula depend on the "preorientation" of the thread and the stretch factor. Figures 2; references 8: 5 Russian, 3 Western.

[312-12765]

UDC 678.743.43-13.01:54

POLYMER-CARBON BLACK INTERACTION IN ELECTRICALLY CONDUCTING FIBER-FORMING
COMPOSITES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 83 (manuscript received
26 Nov 82) pp 23-24

KONOVALOVA, L. Ya., YEFIMOVA, S. G., POKROVSKAYA, N. B. and NIKITIN, A. A.

[Abstract] In preparing electrically conducting polymer materials such as films and fiber by adding a conducting component to the polymer, it is important to know the interaction between the polymer and the filler, since this determines both the mechanical and electrical properties of the composite. In the present work a study was made of the possibility of evaluating the nature of this interaction from the content of filler in the composite by measuring acetone adsorption and density. Fluoroplast-42V (tetrafluoroethylene-vinylidene fluoride copolymer) filled with 0-50% by weight of PM-100 carbon black was chosen because films of this material are used as a coating on threads to form electrically conducting composite fibers which are then used to make anti-static and screening fabric. Adsorption isotherms at 20° and densities at 29.5° of the samples showed that this method can be used to evaluate polymer-filler interaction in Fluoroplast-42V - carbon black composites. Figures 2; references 4 (Russian).

[312-12765]

EFFECT OF POLYMER MATRIX ON PROPERTIES OF FIBERS OBTAINED BY CAKING POLYMER DISPERSIONS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 83 (manuscript received 5 May 83) pp 29-30

KOLDOBSKIY, A. L., DREYZENSHTOK, G. S., SOROKIN, Ye. Ya., PEREPELKIN, K. Ye. and SLIN'KO, L. V.

[Abstract] Fibers may be formed from infusible and insoluble polymers by shaping them from a dispersion containing another polymer as thickener, and then eliminating this polymer by pyrolysis. This is the method used to make fibers from dispersions of polytetrafluoroethylene (PTFE) in cellulose. However, the presence of cellulose and its pyrolysis products and the rate of their removal affect the subsequent caking of the PTFE and the orientation and properties of the resulting fiber. In the present work an estimate is presented of the pore size resulting from statistically dense packing of spherical particles with known distribution radii applicable to fiber preparation by the above method. Physical and mechanical properties of PTFE fibers are correlated to the ratio of the initial volume of cellulose matrix to pore size as a result of packing dispersed particles of Fluoroplast-4. A marked drop in maximum stretch factor and thread strength is due to excess cellulose which inhibits caking of PTFE particles and increases defects in thread structure. Figures 2; references 7 (Russian).
[312-12765]

UDC 677.494.675:678.049.91

PREPARATION OF FIRE-RESISTANT INFUSIBLE POLYCAPROAMIDE FIBER

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 83 (manuscript received 12 Jul 83) pp 31-32

EFROS, A. V., TYUGANOVA, M. A. and GAL'BRAYKH, L. S.

[Abstract] Preparation of fire-resistant polycaproamide textiles by introducing phosphorus compounds to their composition results in lower physical mechanical properties of the fibers. Also, most methods for lowering flammability do not prevent melting of the fiber. A method is described for preparing fire-resistant polycaproamide fibers using a three-component synergistic system of antipyrenes consisting of graded poly-2-methyl-5-vinylpyridene, a halogen antipyrene and an antimony compound. The effect of the synergistic system of antipyrenes is reinforced by the oxygen index of the fire-resistant polycaproamide fibers and their rate of decomposition. References 5: 4 Russian, 1 Western.
[312-12765]

FLAMMABILITY, SMOKE EMISSION AND HEAT RESISTANCE OF MODIFIED OKSALON FIBERS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 83 (manuscript received 26 Jul 83) pp 32-33

TARASOV, V. A., VOROB'YEV, V. N., SEMENOVA, A. S., KULESHOVA, M. G., OGNEVA, T. M. and PANKINA, O. I.

[Abstract] Although polyoxadiazole fibers have high resistance to heat, they can be ignited with an open flame and remain burning. This can be overcome to some extent by introducing a halogen-containing aromatic group to the macromolecule. A study of the effects of bromine content and its method of introduction shows that 4-5% by weight of bromine in Oksalon thread results in a marked increase in heat resistance and smoke emission, and lower flammability owing to the formation of lattice structures. The method of introduction of bromine to the polymer has no effect on flash point, smoke emission, heat resistance or speed of flame spread, but increasing the bromine content does change the mechanism of combustion inhibition. Figures 2; references 4: 3 Russian, 1 Western.
[312-12765]

UDC 678.742.3:678.027.776:678.044

POLYMERIZATION OF 4MPI IN PRESENCE OF MODIFIED ZIEGLER-NATT TYPE CATALYSTS

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 84 pp 4-5

BUDANOVA, M. A., CHUBKINA, T. B., BAULIN, A. A. and IVANCHEV, S. S.

[Abstract] In order to improve the yield, polymerization of 4-methylpentene-1 (4MPI) was carried out in presence of $\text{TiCl}_3 \cdot 0.3\text{AlCl}_3$ catalyst modified with various oxygen-containing additives at atmospheric pressure in n-heptane as the solvent. It was shown that small quantities of tetrahydrofuran, ethylbenzoate, n-amyl ether, isoamyl ether and tributylphosphate added to the catalytic system (at a 0.2:1 ratio) of $\text{Al}(\text{C}_2\text{H}_5)\text{Cl} + \text{TiCl}_3 \cdot 0.3\text{AlCl}_3$ increased slightly its activity but had a variable effect on stereospecificity. Further addition of these agents led to deactivation of the catalyst. Tributylphosphate was the most effective additive. Kinetic curves for these processes were different: with the tributylphosphate, initial polymerization rate grew rapidly to about 4 g P4PMI/(l min) and then dropped to a constant level after 60 min. Without the additive, the polymerization increased moderately for 40 min to about 2g/(l·min) and then dropped until after 100 min it became constant. In both cases the constant polymerization rate was 0.6 P4PMI/(l·min). Figures 2; references 3: 2 Russian, 1 Western.
[347-7813]

COPOLYMERIZATION OF OLIGOCARBODIMIDES WITH TERMINAL ISOCYANATE GROUPS WITH EPOXYDIANE RESIN

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 84 pp 5-6

SHUKUROV, G. I., PANKRATOV, V. A., KUTEPOV, D. F. and PROKHOROVA, G. A.

[Abstract] To improve the products and safety of the procedure, oligocarbodiimides containing terminal isocyanate groups are synthesized and copolymerized with epoxy-diane resin (ED-20). Copolymerization was carried out in presence of 1% triethylenediamine at 50-220°C for 8 hrs or without a catalyst at 50-240°C for 13 hrs. It was shown that by changing the ratio of starting materials, it was possible to regulate thermal and heat stability of the copolymers as well as their physical-mechanical properties. References 2: 1 Russian, 1 Western. [347-7813]

EFFECT OF ZINC CONTENT ON ELECTRIC PROPERTIES OF POLYZINCORGANOSILOXANES

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 84 pp 6-7

KOSTYLEV, I. M., KIRICHENKO, E. A., DAMAYEVA, A. D., GOLUBKOVA, G. L., SHMANEV, S. V. and POPOV, V. M.

[Abstract] Experimental data were reported of the evaluation of electrical properties of polyzincorganosiloxanes with phenyl and vinyl groups at the silicon atom and containing varying quantities of zinc. It was shown that with an increased content of zinc in these polymers, their dielectric properties improved at room and higher temperatures. This was most probably due to redistribution of electronic density along the chemical bonds of these macromolecules, because of the more positive charge of zinc in comparison to silicon. Also, this created possible ability to form coordination bonds between atoms of electrondonor oxygen and zinc. Excellent insulation characteristics of these films make them useful in the field of electronic and electric machine construction. Figure 1; references 3 (Russian, 1 by Western author). [347-7813]

ANTIFRICTIONAL PROPERTIES OF PA-12 REINFORCED WITH FIBROUS FILLERS

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 84 pp 9-10

KERBER, M. L., MAYNIKOVA, N. F., VOROB'YEV, Yu. V., KRAVCHENKO, T. P. and VALETSKAYA, N. Ya.

[Abstract] Antifrictional properties of materials made of polyamide 12 (PA-12) with synthetic fibers arimide and phenylone were studied in a laboratory setup.

It was shown that introduction of the fillers increased the strength of PA-12 due to lower mobility of the segments of macromolecules on the surface of the filler and strengthened the polymer matrix. The wear of the reinforced PA-12 material was 1.5-4 fold less than that of the starting polyamide. Overall, the use of synthetic fibers in reinforcing polyamide-12 improved its frictional properties about as well as carbon fibers. Figures 2; references 7: 6 Russian, 1 Western.
[347-7813]

UDC 678.744.32.01:66.085.33

THERMOMECHANICAL PROPERTIES OF RADIATIONALLY SOLIDIFIED OLIGOESTERACRYLATES

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 84 pp 17-19

LOMONOSOVA, N. V. and CHIKIN, Yu. A.

[Abstract] Unsaturated oligoesteracrylates (OEA) are used widely as binders in various composites obtained by radiation solidification. Their thermomechanical properties were investigated using the methods of isothermic heating and thermomechanics. The following specimens were studied: dimethylacrylates of ethyleneglycol, triethyleneglycol (TGM-3), tetraethyleneglycol (TGM-4), tridecaethyleneglycol and a mixture of TGM-4 and methylmethacrylate. During the solidification, the OEA formed spacial network with many of their chain fragments in a stressed state. With heating, a certain "thawing" of this stress took place, represented by a plateau on the isothermal heating curve. Then a sharp peak occurred in a short temperature interval. With an increase in the adsorbed dose, a more stable network did form. Addition of a small quantity of FeCl_3 (an effective inhibitor of radical chain processes) to a solidified sample of TGM-3 resulted in the disappearance of the high temperature maximum. In general, high thermal stability of tridimensional network of radiation solidified oligoesteracrylates preserved adequate deformation--stability properties during sample testing at elevated temperatures. Figures 2; references 3 (Russian).
[347-7813]

UDC 678.072:621.792

ADHESION OF REACTOPLASTICS TO STEEL

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 84 pp 30-32

SOKOLOV, A. D., RYVKIN, A. G. and MOISEYEV, V. F.

[Abstract] Adhesion of reactoplastics to steel increases greatly with elevated temperature and pressure. This phenomenon was analyzed usually from the aspect of the properties of plastics, rather than from the aspect of steel

characteristics. In the present study adhesion of a number of widely used reactoplastics to stainless steel was investigated. The results showed that the hardness of steel has an effect on the adhesion of polymer; increased pressure leads to plastic deformation of the instrument. With a pressure of 30 MPa and temperature of 170°C, steel hardness should be at least HRC 48 for processing of reactoplasts with organic fillers, and HRC 51 for plastics with mineral fillers. With higher temperature (for example, 200°C), steel hardness should be at least HRC 58. Steel products which have low hardness (HRC 44-48) even after thermal annealing show high adhesion to the polymeric material. Traditional chromium plating resulted in lowest adhesion of all types of plastics. Figure 1; references 2: 1 Russian, 1 Western.
[347-7813]

UDC 678.5.06:63.691

EFFECTIVENESS OF UTILIZATION OF POLYMER MATERIALS IN AGROINDUSTRIAL COMPLEXES

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 84 pp 55-56

GROKHOVSKIY, S. G.

[Abstract] Advantages of substituting plastic materials for commonly-used steel, wood or cement have been discussed as they applied to agricultural construction. During 1985, the production of resins and plastics designed for construction will be 750,000 tons; 400,000 tons more than in 1980, leading to considerable savings in national economy. Concrete steps are being undertaken in the Ukraine, Lithuania and in the RSFSR to construct storage facilities from plastic materials. Several plants are being constructed for production of plastic materials for construction purposes. This should lead to considerable savings and accelerated progress in this program.
[347-7813]

UDC 547.557:541.147.7

SENSITIZATION OF PHOTOSTRUCTURALIZATION (PHOTOCROSSLINKING) OF POLYMERS WITH SELECTED ORGANIC AZIDES AND TRIAZENES

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 50, No 7, Jul 84
(manuscript received 17 Jun 83) pp 768-771

POCHINOK, A. V., POCHINOK, V. Ya., NIZHNIK, A. S. and TYLTINA, L. I., Kiev State University imeni T. G. Shevchenko

[Abstract] Photochemical breakdown of azides and triazenes in chlorinated polyethylene and oligourethanemethacrylate was investigated. Analysis of the data obtained showed that azides and triazenes are better sensitizers of the polymer photocrosslinking than the currently used benzophenones, benzoin and

its methyl ether. Monoazides of 4-azidoacetophenone, 4-azidoazobenzene, etc., exhibited some sensitizing effect but not as strong as the diazides. In presence of azides and triazenes, photostructuralization of polymers with unsaturated bonds and/or chlorine takes place. The crosslinking of the polymers results from the addition of dinitrenes to their double bonds. In presence of oxygen, the photolysis of azides at room temperature gives an EPR singlet; oxygen evidently increases the chance of nitrene's transition from a singlet to a triplet state. Figures 2; references 12 (Russian). [349-7813]

UDC 541.64:547.673

PHOTOSENSIBILIZED CROSSLINKING OF HIGH PRESSURE POLYETHYLENE WITH 9,10-PHENANTHRENEQUINONE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 7, Jul 84 (manuscript received 11 Jul 83) pp 771-775

SHAPOVAL, O. V., MYSHKO, V. I. and KACHAN, A. A., Petrochemical Division, Institute of Physical Organic Chemistry and Coal Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] The goal of the study was to evaluate the photosensitized phenanthrenequinone (PQ) crosslinking characteristics in respect to high pressure polyethylene (HPPE). In general, the photoconversion process of PQ occurs quite rapidly in air, reducing the PQ to semiquinone form which then forms a complex with the starting PQ. The crosslinking process occurs via the oxygen-containing compounds; photodecomposition of hypoperoxide plays an important role in this process. In spite of the presence of polymer macroradicals in this system, the formation of gel fractions resulting from their recombination does not take place probably because of quick oxidation of these radicals. Figures 4; references 15: 12 Russian (1 by Western authors), 3 Western. [349-7813]

UDC 547.538.151:678.045.3

EFFECT OF PEROXIDES AND ALIPHATIC MERCAPTANS ON MOLECULAR WEIGHT DISTRIBUTION OF SYNTHESIZED POLYSTYRENE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 7, Jul 84 (manuscript received 21 Jul 83) pp 775-778

MEL'NICHENKO, V. I., BOVKUNENKO, O. P., YENAL'YEV, V. D., BILOBROV, V. M. and PODOSENOVA, N. G., Donetsk State University

[Abstract] Experimental results were reported of the effect of concurrent presence of mercaptans and peroxide initiators on mass-molecular weight distribution (MWD) of polystyrene. Benzoylperoxide (BP) and tert-butylperbenzoate

(TBPB) were used as polymerization initiators. The regulators used were the following mercaptans: n-butyl-, n-lauryl-, tert-octyl-, tert-decyl- and tert-dodecyl-. The MWD was found to be a function of the participation of above mercaptans and initiators in the initiation reaction, in propagation of the polymer chain and in direct interaction between them. A maximum was observed on the curves $\overline{M}_w/\overline{M}_n$ vs monomer conversion which was a function of the structure of mercaptan. Normal mercaptans showed this maximum at 20-40% conversion point, tertiary mercaptans had this maximum shifted towards higher conversion rates. Figures 3; references 13: 5 Russian, 8 Western.
[349-7813]

UDC 541.15.540.4

NATURAL RADIATION DOSE ABSORBED BY ORGANIC MATERIALS FROM SEDIMENTARY ROCKS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 4, Jun 84
(manuscript received 21 Jul 83) pp 895-898

SKLYARENKO, I. Ya., GOTTIKH, R. P., STADNIK, Ye. V. and MEL'CHUK, B. Yu.,
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Moscow

[Abstract] The goal of this study was to evaluate qualitatively the absorbed dose of natural radiation in case of non-uniform distribution of organic material (OM) in sedimentary rocks. Theoretical discussion of the energy transfer from α -particles to OM is presented out and calculations were done of the absorption of energy by different size intrusions of OM. Since the α -particle energy can be utilized almost totally for ionization of the medium, it was concluded that a significant portion of it would be spent on chemical reactions. During the geological periods, when uranium and organic materials were included in these rocks, the OM could have been subjected to considerable effect of the α -particles. Because radiation-chemical reactions lead to the formation of light (H_2 , CH_4 , C_2H_6) products as well as to heavy ones (polymers, resins, carbonaceous compounds), it was concluded that the radiation-chemical mechanism of the OM conversions could be quite reasonably considered as one mechanism of the formation of petroleum and gas. References: 12 Russian (1 by Western author).
[310-7813]

UDC 546.791.161 + 543.51

THERMOCHEMICAL CHARACTERISTICS OF URANIUM FLUORIDE UF_n MOLECULES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 7, Jul 84
(manuscript received 3 Nov 83) pp 1603-1609

GOROKHOV, L. N., SMIRNOV, V. K. and KHODEYEV, Yu. S., Institute of High Temperatures, USSR Academy of Sciences, Moscow

[Abstract] Mass-spectrometric study of the reactions of UF_5 and lower fluorides (UF_3 , UF_2 and UF) was carried out to determine the enthalpies of formation of

these molecules and to calculate the energies of $UF_{n-1}-F$ bond break. The data used for calculating enthalpies of these reactions were tabulated. Experimental data were compared with literature citations recalculated to a common base. There were unexplained differences observed in the enthalpy of the formation of $UF_3(g)$ with the work of Hildenbrand. On the basis of the experimental results coupled with the enthalpy of formation as reported by Gurvich, the energies of the $UF_{n-1}-F$ bond break were calculated to be: $n=1$ 657 ± 25 , $n+2$ 671 ± 34 , $n=3$ 600 ± 25 , $n=4$ 621 ± 18 , $n=5$ 379 ± 19 and $n=6$ 314 ± 12 kJ/mole. References 19: 5 Russian, 14 Western (1 by Russian authors). [348-7813]

UDC 667.622.117.22

STUDY OF STRUCTURE OF PRECIPITATES, FORMING DURING ELECTROCOAGULATION
PURIFICATION OF WASTE EFFLUENT

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 3, Mar 84
(manuscript received 14 Jul 82) pp 534-539

SAVITSKAYA, I. V., MAKAROV, V. M., VASIL'YEV, S. V., INDEYKIN, Ye. A.,
IVANOV, A. V., YUSOVA, A. P. and BABANIN, V. F.

[Abstract] Precipitates obtained by electrocoagulation with steel anodes of waste effluent from metal plating shops are currently dumped and pose health hazards. The precipitates contain 70-80% iron hydroxides and could be used to prepare iron oxide pigments, magnetic materials and catalysts, but their structure and effects on the treatment process must first be known. In the present work, the structure of these precipitates was studied employing X-ray analysis, derivatography and Mossbauer spectroscopy. The precipitate was found to consist chiefly of the gamma form of ferric hydroxide. It is possible to modify the precipitate by seeding with goethite either before or after the electrocoagulation to give a product containing 40% alpha-ferric hydroxide. Figures 2; references 6: 5 Russian, 1 Western.
[314-12765]

UDC 628.33:626.34

PURIFICATION OF ACIDIC INDUSTRIAL EFFLUENT WITH CALCIUM CARBONATE SLUDGE

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 7, Jul 84 pp 8-9

KOREN'KOVA, S. F., candidate of technical sciences, BEZGINA, L. N. and
MANZULLINA, G. Z., engineers, Kuybyshev Engineering-Construction Institute

[Abstract] Calcium carbonate sludge can be used to improve the quality and effectiveness of the purification of acid, metal-containing effluents. The use of such sludge leads to lower operational costs resulting from the decreasing consumption of expensive reagents (polyacrylamide, iron sulfate) and the expenses for storage and transportation, because the sludge is an inexpensive widely available industrial waste. Due to its high dispersion power (it takes 24 hrs to sediment) it is a very effective reactive material providing immediate contact and interaction with the effluent components. Figures 2; references 2 (Russian).
[353-7813]

EQUIPMENT FOR DAMPING HYDRAULIC SHOCK

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 7, Jul 84 pp 9-10

ASHCHYANTS, E. P. and RAFAELIAN, R. M., candidate of technical sciences, Scientific Research Institute of Water Problems and Hydrotechnology, Yerevan

[Abstract] One of the methods for damping hydraulic shocks at the pressure pipelines of pump stations is to discharge water from the pipe through the pump in the reverse direction. New equipment was developed for damping hydraulic shock based on limited discharge of water through the opening of a reverse disk valve with simultaneous automatically-controlled overlap of the flow in the pipelines. Degree of damping the hydraulic shock depends on the diameter and the number of openings in the reverse disk valve. This equipment is recommended for pump station pipelines with a diameter of 100-300 mm, equipped with reverse valves working under pressures of up to 1.2 MPa. Figures 2; references 3 (Russian).

[353-7813]

UDC 628.147.22:620.197.6

STEEL PIPES WITH INTERNAL CEMENT-POLYMER LINING

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 7, Jul 84 pp 18-19

LITINSKIY, Z. E., MALASHCHENKO, V. A., FRIDMAN, A. A., candidate of technical sciences and SHAPIRO, I. A., engineer, RSFSR Ministry of Land Reclamation and Water Resources; All-Union Scientific Research Institute of Water Geology

[Abstract] Experimental results are reported of the evaluation of internal cement-polymer lining of steel pipes during welding and pipe laying operations. The pipes were 10 m long with an internal diameter of 300 mm and wall thickness 3-4 mm. Experimental lining consisted of cement and a silicon-organic material GKZh-11 while controls had cement lining only. The results showed that all linings adhered well to the steel walls and maintained their protective property well even in the area of the welding seam. Connecting the pipes according to the accepted methods did not affect the lining. During mass production of such pipes, special attention should be paid to removal of oil traces from the inside surface of the pipes prior to the deposition of protective lining. Small cracks (0.025-0.1 mm) due to the connecting operations were noticed on the protective surface but appeared to have had no detrimental effect on the protective layer. References 3 (Russian).

[353-7813]

ELECTROCHEMICAL OXIDATION OF 'ROXAPHENOL H-6' OVER PLATINUM ELECTRODES

Moscow ELEKTROKIMIYA in Russian Vol 20, No 8, Aug 84 (manuscript received 2 Jul 79, after revision 10 May 82) pp 1028-1031

GOZHKA, Z. and SOKHA, A., Institute of General Chemistry, Lodz; Lodz Polytechnic Institute

[Abstract] Experimental results are reported of the oxidation of "Roxaphenol H-6" on platinum electrode. "Roxaphenol H-6" is a condensation product of nonylophenol with six ethylene oxide molecules--18-p-nonylophenolo-3,6,9,12-15,18-hexaoxaoctadecan-1-ol. It was shown that this material undergoes electrooxidation in the entire range of investigated potentials, i.e., 0.9 to 2.5 V. At potentials below 2.1 V, where the anode exhibits some inertia, the reaction is slowed down. Potentials above 2.1 V are of practical value. Carboxylic acids are among the oxidation products. Figures 3; references 14: 9 Russian, 5 Western (1 by Russian authors).
[364-7813]

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